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AEROSPACE MEDICINE AND BIOLOGY

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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

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In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis will be placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion. The contents of this issue are comprised of abstracts that were prepared by the three contributing organizations.

Each entry consists of a standard citation accompanied by its abstract. It is included in one of three groups of references that appear in the following order:

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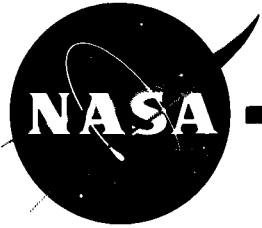
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AEROSPACE MEDICINE AND BIOLOGY

a continuing bibliography

JUNE 1965



STAR ENTRIES

N65-18647# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

DISTURBANCES IN PURKINJE FALSE IMAGES IN NEUROSES AND CERTAIN PSEUDONEUROSES INVESTIGATED BY THE OPTOINDUCOGRAPHIC METHOD

J. Vyskocil and L. Vojtanova 14 Nov. 1964 16 p refs Transl. into ENGLISH from *Cesk. Neurol. (Czechoslovakia)*, v. 26, no. 4, Jul. 1963 p 271-279
(FTD-TT-64-52/1+2; AD-452068)

Optoinducographic methods were employed to observe the false images of 52 neurotics and 53 pseudoneurotics. Measurement criteria were the threshold sensitivity, duration of latency and false image, sizes, clearness of contours, movement, rate of appearance and disappearance, and the color of the false image. It was found that neurotics had 90% false images in a complementary color, and only perhaps 10% of them in gray, whereas pseudoneurotics with arteriosclerosis or with hypertension had gray false images in 86% and 70%, respectively, either at short exposure or at disappearance or repeated false images. The fact that the remaining qualities of Purkinje false images among neurotics and pseudoneurotics were almost identical is considered as a sign of pathophysiological and pathogenic affinity of neurosis and pseudoneurosis.

G.G.

N65-18678# Dunlap and Associates, Inc., Darien, Conn.
HUMAN FACTORS STUDY OF THE USN MARK II HAND HELP SEXTANT Final Report

Nov. 1964 32 p refs
(Contract N140(62462)-76732B)
(DRD-64-133; AD-609048)

Based on available data and laboratory experiments, the following recommendations were made: (1) a double line configuration for the artificial horizon, (2) the use of an astigmatizing lens for accurately determining tangency as well as for facilitating altitude measurement, (3) intensity of the horizon at the same level as that of the body being observed, (4) improvement of readout scales, (5) provision of illumination, (6) neutral polarizing filters for viewing the body, (7) amber and red filters for viewing the horizon, (8) specific control characteristics, (9) a 6 X 30 monocular telescope for the

optimum tradeoff among variables, (10) a large rubber eyecup to provide additional steadiness, (11) a human engineered handle for increased steadiness and comfort, and (12) an upper limit of 4 pounds.
R.L.K.

N65-18684# School of Aerospace Medicine, Brooks AFB, Tex.
ENGINEERING CONSIDERATIONS IN GSR RESEARCH Aeromedical Review No. 4-64

William H. Rickles, Jr. Nov. 1964 22 p refs
(AD-610222)

The critical methodological points involved in studying galvanic skin reflexes (or resistance, both aspects of the same phenomenon and abbreviated GSR) are summarized to assist those concerned with fabricating GSR recording apparatus. The design characteristics pertinent to nine elements of GSR detection circuitry are discussed.
R.L.K.

N65-18784# Joint Publications Research Service, Washington, D. C.

SOVIET RESEARCH IN BIOASTRONAUTICS

10 Mar. 1965 31 p Transl. into ENGLISH of Articles from *Aviats. i Kosmonavt. (Moscow)*, no. 11, Nov. 1964 p 24-36
(JPRS-29069; TT-65-30486) CFSTI: \$2.00

CONTENTS:

1. GROUNDWORK FOR NEW JOURNEYS INTO OUTER SPACE: A UNIQUE EXPERIMENT BY SOVIET SCIENTISTS. 120 DAYS IN A PRESSURIZED CHAMBER p 1-14 (See N65-18785 09-05)

2. NEEDED: A THEORY OF WEIGHTLESSNESS p 15-19 (See N65-18786 09-05)

3. MEDICOBIOLOGICAL SUPPORT OF PROLONGED SPACE FLIGHT p 20-26 (See N65-18787 09-05)

N65-18785 Joint Publications Research Service, Washington, D. C.

GROUNDWORK FOR NEW JOURNEYS INTO OUTER SPACE: A UNIQUE EXPERIMENT BY SOVIET SCIENTISTS. 120 DAYS IN A PRESSURIZED CHAMBER

In its Soviet Res. in Bioastronautics 10 Mar. 1965 p 1-14
(See N65-18784 09-05) CFSTI: \$2.00

Experiments are reported in which human subjects were hermetically sealed for varying periods of time in a chamber simulating a space cabin. Major areas of investigation included changes in the subjects' immunoreactivity, changes in the composition of the enclosed atmosphere such as increased carbon monoxide and dioxide, and measurable physiological, behavioral, and performance changes in the subjects. D.E.W.

N65-18786 Joint Publications Research Service, Washington, D. C.

NEEDED: A THEORY OF WEIGHTLESSNESS

In its Soviet Res. in Bioastronautics 10 Mar. 1965 p 15-19 (See N65-18784 09-05) CFSTI: \$2.00

Consideration is given to various aspects of weightlessness, with emphasis on its effects on men in this condition for extended periods. The threshold of sensitivity to gravity was studied in relation to length of time in weightlessness. Other areas of study included accuracy of movement, bioelectric activity, reduced tendency to nystagmus, gaseous metabolism, and energy expenditures. D.E.W.

N65-18787 Joint Publications Research Service, Washington, D. C.

MEDICOBIOLOGICAL SUPPORT OF PROLONGED SPACE FLIGHT

In its Soviet Res. in Bioastronautics 10 Mar. 1965 p 20-26 (See N65-18784 09-05) CFSTI: \$2.00

Flights to the moon and other astronomical bodies are contemplated, and the increased activity of the support program is discussed. In particular, the stronger role of medical and biological support in the overall program is considered. The analysis of handwriting to detect systemic disturbances during acceleration, normal gravity, or weightlessness is discussed, and a physiological measuring system for installation in a spacecraft is described. D.E.W.

N65-18805* National Aeronautics and Space Administration, Washington, D. C.

THE IQSY AND THE SPACE ROCKET—OBSERVATIONS DURING THE IQSY

Kengich Maeda *In its Surv. of Japan. Space Program with Emphasis on Kappa and Lambda Type Observation Rockets* Feb. 1965 p 61-69 (See N65-18801 09-31) CFSTI: HC \$7.00/MF \$2.25

Separate projects and equipment are described for the International Quiet Sun Year (IQSY). The description is a report of the conference in Rome, in March 1963, preceding the IQSY. Project areas include earth atmosphere composition, weather parameters, temperature, and geomagnetism. J.M.D.

N65-18852# Boeing Co., Wichita, Kans.

VISUAL-MOTOR PERFORMANCE DURING WHOLE-BODY VIBRATION Technical Report No. 5

R. E. Chaney and D. L. Parks Nov. 1964 88 p (Contract Nonr-2994(00)) (D3-3512-5; AD-456271)

Seven male employees were tested in the company's human vibration facility to determine the effect of whole body vibration on visual-motor performance. Six controls, a large and a small knob, a horizontal and a vertical lever, and a horizontal and a vertical thumbwheel were used to adjust a standard 3-inch dial indicator to a prescribed setting. Independent variables included variations in vibration frequency and severity, control force requirements, and task complexity. Speed and accuracy of task accomplishment were recorded for each condition. A high workload condition, vibration independent of frequency and level, and control force requirements individually affected the speed and accuracy of operator adjustment. The type of control used did not influence accuracy, and had only minor influence on adjustment time with mounting position apparently producing the noted differences. Author

N65-18853# Boeing Co., Wichita, Kans.

TRACKING PERFORMANCE DURING WHOLE-BODY VIBRATION Technical Report No. 6

R. E. Chaney and D. L. Parks Nov. 1964 40 p refs (Contract Nonr-2994(00)) (D3-3512-6; AD-456277)

Seven male volunteers were tested to determine the effect of whole body vertical vibration on tracking performance. Compensatory wheel, column, and foot tracking data were obtained at each of 4 subjective reaction levels at frequencies ranging from 1 through 27 cycles/second. A perfect correlation between subjective vibration experience and tracking performance degradation was noted. The largest degree of error was produced in the 10- through 20-cps range with vibration severity (reaction level) differentially affecting the critical frequencies. Foot tracking performance improved as control forces were increased, with less improvement shown under vibration than the nonvibrating control condition. Author

N65-18876# Naval Medical Research Lab., New London, Conn. **PREDICTION OF ADJUSTMENT TO PROLONGED SUBMERGENCE ABOARD A FLEET BALLISTIC MISSILE SUBMARINE. IV: PSYCHOPHYSIOLOGICAL INDICES**

Benjamin B. Weybrew 24 Nov. 1964 36 p refs *Its Vol. 22, No. 18* (Rept.-416; AD-449530)

Fourteen psychophysiological indices of response to hyperventilation and breathholding and to discrimination-conflict stress were combined with measures of neuroticism, motivation, and aptitude to form a correlation matrix including adjustment ratings obtained from 200 men during 2 successive cruises aboard a nuclear submarine. Patterns of psychophysiological indicators with adjustment criteria were identified by factor variables resulted in Multiple R's ranging from 0.40 to 0.62. For the purpose of communication, these factors were labeled limited adjustment potential, optimal adjustment potential resiliency, autonomic feedback, and stress responsivity. The structure of the factors suggested somatopsychological dimensions of use in personality assessment especially when selection of men for hazardous duty is involved. Author

N65-18877# Naval Medical Research Lab., New London, Conn. **A REVIEW OF THE RATIONALE OF THE VISUAL STANDARDS FOR SUBMARINE DUTY**

Paul R. Kent 19 May 1964 19 p refs *Its Vol. 23, No. 10* (Rept.-428; AD-449500)

The visual capabilities of a person just meeting the present minimum visual acuity standard for submarine duty were analyzed and matched with the visual tasks normally found on submarines. Assuming that the standards are based upon unaided visual capabilities, it was found, that in general, the current visual standards are reasonable. It was found possible to modify the visual standard in such a manner, however, that more candidates would pass the visual test, and by analysis, these were found to have binocular visual capabilities at least equal to those minimally acceptable under the current standard. Author

N65-18881# Naval Air Development Center, Johnsville, Pa. Aviation Medical Acceleration Lab.

HEMODYNAMIC AND CINE-RADIOGRAPHIC STUDY OF TRANSVERSE (+G_x) ACCELERATION

Harold Sandler 21 Sep. 1964 54 p refs (NADC-ML-6413; AD-457840)

Cardiopulmonary hemodynamics were studied in dogs during acceleration of +5 G_x, +10 G_x and +15 G_x on the Johnsville centrifuge. Changes in cardiopulmonary parameters were correlated with changes in the heart and lungs recorded by cineradiography and cineangiocardiology using a 9-inch image intensifier X-ray system. Decreases in cardiac output and stroke volume were recorded by dye dilution techniques in all animals and confirmed by cineangiocardiology studies. A marked and consistent fall in arterial oxygen saturation was also recorded. The role of atelectasis as the cause for this fall in oxygen saturation was discussed. Author

N65-18886 Library of Congress, Washington, D. C. Aerospace Technology Div.
BIOLOGICAL AND MEDICAL ASPECTS OF MICROWAVES
 Christopher Dodge *In its* Foreign Sci. Bull. Feb. 1965 p 7-19 refs (See N65-18884 09-34)

A review is presented of recent Soviet research on the effects of microwaves on the state of the nervous system. This is based on 12 articles published by prominent authors in this field during the period 1958-1964. Experimental methods, instrumentation, and various observed effects of microwaves on the animal and human nervous systems are discussed.

Author

N65-18889 Library of Congress, Washington, D. C. Aerospace Technology Div.
THE INFLUENCE OF MICROWAVES ON THE FUNCTIONAL CONDITION OF THE NERVE
 Christopher Dodge *In its* Foreign Sci. Bull. Feb. 1965 p 33-38 ref (See N65-18884 09-34)

The results of investigations of the functional state of the frog nerve (n. ischiadicus) during irradiation with microwaves are described. Included in the study were considerations of excitability thresholds, rate of the conduction of excitation, absolute and relative refractory phases, and amplitude of action currents during irradiation with microwaves of non-thermal intensity in pulsed and nonpulsed systems. Author

N65-18915* Public Health Service, Washington, D. C. Communicable Disease Center
REDUCTION OF BACTERIAL DISSEMINATION GERMICIDAL ACTIVITY OF ETHYLENE OXIDE. REDUCTION OF BACTERIAL CONTAMINATION ON SURFACES Second Quarterly Summary Report of Progress
 Feb. 1965 6 p
 (NASA Order R-137)
 (NASA-CR-57148) CFSTI: HC \$1.00/MF \$0.50

Two adult male humans were tested in a microbiotank facility for whole-body shedding of viable particles (such as bacteria). Duration of confinement, number of trials, type of clothing, previous cleansing of the skin, and mean rate of shedding are tabulated for each subject. A wide variation was found in high shedding rates between subjects in normal street clothes, while the high shedding rates were reduced to almost nominal levels by taking a long shower with a standard hospital-type detergent containing hexachlorophene and then donning a sterile scrub suit, socks and cap. In an effort to reduce bacterial contamination on surfaces, a closed-circuit system for controlled rates of reduction of the relative humidity of the test atmosphere was fabricated. Progress on an investigation of the germicidal activity of ethylene oxide is reported. D.E.W.

N65-18921* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

THE IONIZING RADIATIONS IN SUPERSONIC TRANSPORT FLIGHTS

Trutz Foelsche [1964] 20 p refs Presented at the 2d Symp. on Protect. Against Radiation in Space, Gatlinburg, Tenn., 12-14 Oct. 1964

(NASA-TM-X-56122) CFSTI: HC \$1.00/MF \$0.50

Commercial supersonic transport planes are envisioned to cruise at altitudes up to 23 km or 75 000 feet. The exposure to crew and passengers from galactic and solar cosmic rays at these altitudes on polar routes is estimated and compared with the maximum permissible dose rates (MPD). Estimates of dose rates for the most important intense and energetic flare events (solar cosmic radiation) show that in cruise altitudes at high latitudes and in impact zones, e.g., during the February 23, 1956 event, 1 to 4 rem/hr might have been reached. Such doses are undesirable, even if their occurrence is very rare. If evasive measures are carried out in these cases, such as descending to 40 000 feet (12 km), the radiation doses received by passengers appear negligible ($\approx 10\%$ of the MPD of 0.5 rem/year at 2 polar flights/month) except for the effects of certain characteristic biological effective components of galactic cosmic rays which appear only in high altitudes, i.e., heavy primaries and stars.

Author

N65-18929* California Univ., Los Angeles. Biotechnology Lab.

UPPER EXTREMITY PROSTHETICS RESEARCH, HUMAN TRACKING, SENSORY MOTOR CONTROL, AND MYOELECTRIC CONTROL STUDIES Progress Report

John Lyman 15 Mar. 1964 44 p ref

(Contracts N123(60530)23558A; VA-V1005M-2075; Grant VRA-RD-1201M-64)

(Rept.-64-30; AD-605204)

A needs analysis for the development of externally powered prostheses design specifications is discussed. The current statuses are given for experimental investigations of the Heidelberg pneumatic arm and of the Northwestern University electric elbow. An evaluation of the Optiscan head-mounted eye-movement camera for prosthetic motor-skills evaluations showed several serious deficiencies involving camera focusing, the ground glass, parallax, exposure, and overall design of the instrument. Work is reported on the AIPIR arm, on transducer development, and on functional muscle isolation. Two aspects of work on the performance of human operators of tracking systems are discussed, including a performance evaluation of variables of the optical system on a particular tracking simulator, and a human operator tracking study with a serially arranged two-man team.

D.E.W.

N65-18938* Florida State Univ., Tallahassee. Dept. of Psychology

PERIPHERAL MECHANISMS OF HUMAN TEMPERATURE SENSITIVITY Final Report, 1 Sep. 1961-31 Aug. 1964

D.R. Kenshalo [1964] 14 p refs

(Grant NSG-148-61)

(NASA-CR-57207) CFSTI: HC \$1.00/MF \$0.50

A thermal stimulator utilizing a Peltier refrigerator as transducer and able to measure skin temperatures to $\pm 0.025^\circ\text{C}$ accurately within the physiological limits, and a modified Peltier refrigerator containing a photoelectric plethysmograph for recording of cutaneous blood vessel volume changes is described. These were employed to measure the intensity of

radiant energy necessary to produce a threshold warm sensation as a function of the size of the area of the skin exposed, and showed good agreement between the measurements of the cool threshold and the volume pulse amplitude. Tests indicated no marked sensitivity changes to either warm or cool stimuli for either sex with advanced age. Changes in the cool threshold of female subjects were associated with the estrogen-progesterone level in the ovarian cycle and showed generally more sensitivity to cooling than the male counterparts of the same age group. Females adapted more completely to higher skin temperatures than males. In drug studies, adrenalin iontophoresis into the skin produced vasoconstriction in the area of stimulation and depressed the cool threshold. Experimental investigation of the course of adaptation to thermal stimuli indicated a range of about 29° to 37.5° C for the individual physiological zero values.

G.G.

N65-18963# Cutler-Hammer, Inc., Deer Park, N. Y. Airborne Instruments Lab.

FORM PERCEPTION IN VIDEO VIEWING: EFFECTS OF FORM CONTENT AND STEREO ON RECOGNITION Final Report

Larry W. Paine Bedford, Mass., AFSC, Electron. Systems Div., Sep. 1964 38 p refs

(Contract AF 19(628)-328)

(ESD-TDR-64-666; AD-609992)

Recognition values, under varying levels of image degradation, were determined for randomly constructed objects of varying complexity (contour turns) and for familiar geometric objects. Values for both familiar and unfamiliar objects were significantly affected by image degradation, but were unaffected by using stereo viewing as compared with nonstereo viewing. Variations in the effective interobjective distance between stereo images had no significant effect on recognition values.

Author

N65-18966# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.

FUNCTIONAL FUNDAMENTALS TRAINING FOR ELECTRONIC MAINTENANCE PERSONNEL

John P. Foley, Jr. Nov. 1964 60 p refs

(AMRL-TR-64-85; AD-610367)

Previous experiments concerning functional electronic fundamentals have applied the functional principles to training for a very limited and specific area of maintenance—in some cases to only one electronic equipment. This experiment was designed to include the fundamental tasks and concepts applicable to all of the electronic communications specialties. The course was organized around specially designed trainers that incorporated the desired circuits and task requirements. Considerable well spaced maintenance practice was given using common test equipment such as vacuum-tube voltohmmeter, signal generator, and oscilloscope. The curriculum development principles and procedures as well as the results of controlled experiments are given. The findings indicated that the traditional and experimental courses were equally successful in training high aptitude students. The experimental course was much more successful, however, in training average aptitude students. The job success of the average aptitude graduates was equivalent to that of the higher aptitude graduates.

Author

N65-18967# Industrial Biology Research and Testing Labs., Inc., Philadelphia, Pa.

CUTANEOUS TOXICITY EVALUATION OF AIR FORCE DEVELOPMENT MATERIALS, VII Technical Report, Jun.-Oct. 1964

Morris V. Shelanski Wright-Patterson AFB, Ohio, AMRL. Dec. 1964 21 p refs

(Contract AF 33(615)-1571)

(AMRL-TR-64-120; AD-610520)

Five Air Force development materials were studied via the prophetic patch test method on laboratory animals to determine the primary irritant effect, gross sensitization index, and gross percutaneous toxicity of these materials. The patch test studies with rabbits indicated that two of the materials produced severe primary irritant action. A third material produced primary irritation whose severity was not considered sufficient to preclude testing on humans. Therefore, testing on human volunteers was carried out with three of the materials. Results indicated that only one of these materials was safe to use in contact with human skin.

Author

N65-18971# American Foundation for Biological Research, Madison, Wis.

INJURY CAUSED BY THE FORMATION OF ICE IN THE ISOLATED MUSCLES OF RATS

B. J. Luyet and F. W. Gonzalez Ft. Wainwright, Alaska, Arctic Aeromed. Lab., Oct. 1964 6 p refs

(Contract AF 41(657)-343)

(AAL-TDR-63-39; AD-610384)

Previous investigations showed that the feet of mice and rats can recover completely after having been exposed in the frozen state at -10°C for 10 and 20 minutes. In the present work, a study was made of the ability of a single excised component of the rat limb, namely the tibialis anticus muscle, to survive freezing. The muscle, coated with vaseline and carrying an inserted thermal junction, was immersed directly into a bath at -3° , -5° , or -10°C . When the internal temperature had dropped to -2°C , the muscle was seeded (to initiate ice formation) and maintained in the frozen state for various lengths of time. It was rewarmed by abrupt transfer to a water bath at 35°C and tested for its ability to contract when electrically stimulated. In baths at -3°C the muscles survived 40 to 45 minutes in the frozen state, in baths at -5°C they survived 15 minutes but not 20 minutes, and no survival was obtained in muscles kept frozen for even only 1 minute at -10°C .

Author

N65-18972# American Foundation for Biological Research, Madison, Wis.

COMPARATIVE STUDY OF FREEZING INJURY IN A HIBERNATOR AND A NONHIBERNATOR

B. J. Luyet and R. J. Williams Ft. Wainwright, Alaska, Arctic Aeromed. Lab., Oct. 1964 8 p refs

(Contract AF 41(657)-343)

(AAL-TDR-63-39; AD-610388)

An attempt is made to ascertain whether the ability of the hamster to escape freezing injury may be related to its ability to hibernate. The feet of hamsters, in the nonhibernating state, and of albino rats were cooled at ambient temperatures of -10° , -8° , -6° and -4°C , seeded when the center of the paw had reached a given below-freezing temperature, and maintained in the frozen state for various lengths of time. It was found that, while the course of temperature during cooling

and freezing and the general appearance of the limb in the frozen state did not differ significantly in the two animals, the subsequent manifestations of injury and the extent of recovery did. The amount of swelling was considerably more in rats than in hamsters. Hamsters' paws frozen for 20 minutes in -10°C recovered more rapidly than rats' paws treated in the same way; hamster limbs frozen for 1 hour at -10°C recovered completely, while rat limbs similarly frozen showed necrosis. Author

N65-18973# Utah Univ., Salt Lake City. College of Medicine
EFFECT OF DIFFERENT ROUTES OF CHALLENGE OF COXSACKIE B VIRUS ON COLD-STRESSED MICE

Stanley Marcus and Fred Miya Ft. Wainwright, Alaska, Arctic Aeromed. Lab., Oct. 1964 10 p refs

(Contract AF 41(657)-311)

(AAL-TDR-64-2; AD-610389)

Adult albino mice were given Coxsackie B virus via intrathoracic, intraperitoneal, intranasal, and aerosol routes. The mice were either acclimatized or unacclimatized to 2°C ambient temperature, and in one challenged group normal mice were compared to specifically immunized animals. No deaths occurred in the control animals (21°C) challenged intranasally or by aerosol; however, 5/10 mice were killed by the intrathoracic challenge and 1/10 died from the intraperitoneal challenge. In general the mice unacclimatized to 2°C had higher mortality ratios than acclimatized animals in all challenged groups regardless of the route of challenge. Intranasally and intraperitoneally challenged mice had similar mortality ratios in all groups tested. Many of the deaths of the intrathoracically challenged mice are attributed to the procedure of challenge. The few deaths in the aerosol challenged groups are thought to be a dose-related factor. Author

N65-18974# Aerospace Medical Div. Arctic Aeromedical Lab., Fort Wainwright, Alaska.

THE EFFECTS OF DIET ON HMP DEHYDROGENASE AND MALIC (TPN) DEHYDROGENASE IN THE RAT

David A. Vaughan and Robert L. Winders Oct. 1964 13 p refs (AAL-TDR-64-13; AD-610611)

The effects of several types of diets and feeding procedures upon the activities of hexosemonophosphate (HMP) dehydrogenase and malic (TPN) dehydrogenase were studied in rats. Inclusion of dietary fat at levels 15% or above depressed activity of both enzymes. Diets high in protein, and containing only 2% carbohydrate, depressed the activity of malic (TPN) dehydrogenase but had no effect on HMP shunt dehydrogenase. Fat, fed concurrently with carbohydrate, depressed activity of both enzymes but had little effect when fed on alternate days. Regeneration of HMP dehydrogenase activity after fasting was greatest during 75% protein + 17% alanine refeeding, followed in intensity by 90% protein, 75% protein + 17% glutamic acid, and least on an N-free high carbohydrate diet. Malic (TPN) dehydrogenase, under these circumstances, was stimulated only by the N-free high carbohydrate diet. Substitution of starch or dextrin for glucose in high carbohydrate diets had a depressing effect on both of the enzymes studied. Author

N65-18999# California Univ., Davis. Agricultural Experiment Station

RADIATION TECHNOLOGY IN CONJUNCTION WITH POSTHARVEST PROCEDURES AS A MEANS OF EXTENDING THE SHELF LIFE OF FRUITS AND VEGETABLES Annual Report, Feb. 1, 1963-Jan. 30, 1964

E. C. Maxie, N. F. Sommer, and D. S. Brown Washington, AEC, Nov. 1964 171 p refs

(Contract AT(11-1)-34)

(UCD-34P80-2) CFSTI: \$5.00

It appears that irradiation will not be an all-inclusive technology for fruits and vegetables. If it has a role, it will likely be confined to a limited number of species or varieties, perhaps at certain physiological stages. Irradiation technology is most likely with fruits that have a relatively short postharvest life. The most promising fruit studied was the strawberry; 200 Krad of gamma irradiation appeared to reduce decay substantially under simulated transit conditions without severe damage to quality. Sweet cherries also showed some promise, although there was a loss in texture which would have to be evaluated in commercial shipments. Table grapes and lemons destined for long-term storage were poor subjects for irradiation. Washington Navel oranges responded favorably. Some benefits were observed from irradiation of dewberries, figs, pineapples, raspberries, peaches, nectarines, and asparagus. Gamma irradiation appeared to have limited application for tomatoes, although the possibility of combining ethylene treatment and irradiation showed promise. Radiation did not increase the storage life or quality of slicing cucumbers. Also discussed are radiation mycology, quantitative dose-response of prunus fruit-decay fungi to gamma irradiation, and the sensitivity of citrus fruit decay to gamma irradiation. R.L.K.

N65-19004# Army Natick Labs., Mass. Pioneering Research Div.

REFERENCE ANTHROPOMETRY OF THE ARCTIC-EQUIPPED SOLDIER

Robert M. White, Theodore R. Zimmerer, and John L. Kobrick Aug. 1964 27 p refs

(EPT-2; AD-449483)

Data are presented on body dimensions for the size range of the Army population dressed in the Army arctic clothing ensemble. The information is presented in tabular form, accompanied by diagrams denoting the exact location of the specified dimensions. Author

N65-19005# TRW Semiconductors, Inc., Lawndale, Calif. Research and Development Dept.

PRODUCTION ENGINEERING MEASURE: TRANSISTOR, VHF, SILICON, POWER (5W-70mc) Final Report, 1 Jun. 1961-31 Mar. 1964

B. Rappaport [1964] 254 p

(Contract DA-36-039-SC-85960)

(TE-4000-15-F; AD-609741)

Advances in the device and package design are discussed as well as process improvements which were instituted. A description is given of the necessary special fabrication and test equipment. The pilot run is summarized in terms of performance achieved and available capacity of the pilot production line. Test results of the preproduction samples and the final acceptance samples are given. Information necessary to the reproduction of the pilot run is presented including input parameters, a flow chart, and a process manual. Author

N65-19017# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.

TRAINING FOR CULTURE-CONTACT AND INTERACTION SKILLS Preliminary Report, Feb. 1963-Aug. 1964

Donald B. Haines Dec. 1964 32 p refs

(AMRL-TR-64-109; AD-611022)

This report outlines a procedure for collecting in the field those cross-cultural behaviors most critical for the success of the advisory mission. A means of categorizing these behaviors for incorporation into a training program is described. Those behaviors requiring passive knowledge may be easily taught by traditional lectures and handbooks. Other behaviors may be taught by programmed instructional materials while some require such subtleties of skill and motor facility that they require more elaborate teaching methods. A new method for teaching interaction skills through the use of a video type recorder is also presented. Subjects are placed in a simulated cross-cultural situation requiring interaction skills known to be critical in the advisor-advisee relationship. They learn these skills through self-confrontation with video-aural playback of their behavior.

Author

N65-19028# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
IN THE DETACHMENT OF ASTRONAUTS
 P. S. Denisjuk 4 Dec. 1964 21 p Transl. into ENGLISH from Sov. Kirgiziya (USSR), no. 182-185, 6-9 Aug. 1963 p 4 (of each issue)
 (FTD-TT-64-398/1; AD-609924)

The notes of one of the trainers who prepared the cosmonauts for space flight are presented in rough draft translation. Some of the cosmonauts noted are Gagarin, Bykovskiy, Tereshkova, and Popovich. The notes are concerned mainly with the activities, conversations, and relationships of the cosmonauts.

D.E.W.

N65-19038*# National Aeronautics and Space Administration, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY A Continuing Bibliography
 Feb. 1965 112 p refs
 (NASA-SP-7011(08)) CFSTI: HC \$1.00/MF \$0.75

An annotated bibliography is given of unclassified reports and journal articles that were introduced into the NASA information system during this period. The subject matter covers biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the atmosphere or in space. These references were announced previously in separate publications by the Library of Congress, the American Institute of Aeronautics and Astronautics, and NASA. The references are indexed by subject, corporate source, and personal author.

R.L.K.

N65-19116# Ohio State Univ., Columbus. Lab. of Aviation Psychology
EXPERIMENTS ON TEAM TRAINING IN A CIC-TYPE TASK ENVIRONMENT
 George E. Briggs and James C. Naylor Jun. 1964 39 p refs
 (Contract N61339-1327)
 (NAVTRADEVEN-1327-1; AD-608309)

Laboratory experiments on team training in a simulated CIC environment were conducted. Effects of replacement, task organization and complexity, task fidelity, and amount of experience were investigated. Individual rather than team training is the preferred procedure for tasks requiring interaction among operators.

Author

N65-19139# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
OXYGENATION OF BRAIN TISSUES DURING AIR AND OXYGEN RESPIRATION WITH AN ADMIXTURE OF CO₂
 Ye. A. Kovalenko, V. L. Popkov, and I. N. Chernyakov 23 Nov. 1964 13 p refs Transl. into ENGLISH from Fiziol. Zh. SSSR (Moscow), v. 50, no. 2, 1964 p 177-182
 (FTD-TT-64-634/1+2+4; AD-609135)

The dynamics of O₂ in brain tissues during respiration of gas mixtures with an increased content of O₂ and CO₂ is presented. There is an absence of a directly proportional dependence between O₂ tension in the blood and in the brain tissues; with an increase of oxygen tension (pO₂) of 1.5 to 2 times in brain tissues, the pO₂ in the lungs and in the blood is increased 5 to 6 times. The experiments were conducted on dogs using chronically implanted electrodes in the brain, and the pO₂ was determined in the cortex and the subcortex. The gas mixtures were specially developed and fed through a hermetic mask into the respiratory tract of the animal. It is concluded that the oxygen tension in the cortex and the subcortex is increased during respiration of air with 5% and 10% CO₂ added; respiration of pure oxygen and of the gas mixture oxygen with 5% to 10% CO₂ also increases the oxygen in the brain tissues.

R.W.H.

N65-19148# Göttingen Univ. (West Germany). Physiological Inst.

RESEARCH ON CARDIAC PRESSORECEPTORS Technical Report, 1 Jan. 1962-31 Jan. 1964

K. Kramer Wright-Patterson AFB, Ohio, AMRL, Dec. 1964 30 p refs
 (Grant AF-EOAR-61(052)-541)
 (AMRL-TR-64-94; AD-611563)

Pressoreceptor reflexes affecting coronary blood flow were investigated. No indication of reflexly induced changes of coronary vascular resistance was found. Peripheral vagal stimulation resulted in a 25% increase in diastolic flow indicating vagal influence on the resistance of coronary vessels. Adrenalin injected into a coronary branch led to dilation prior to its effect on the contractile force of the heart. The effects of two representative catecholamines on coronary blood flow were investigated. Using a beta-receptor blocking agent, both constrictor and dilator effects have been observed following adrenergic stimuli. Separate pressure elevation in the main trunk of the left coronary artery caused peripheral dilation. Bradycardia was also observed. Although this is believed to be a part of a depressor reflex action, there is no evidence that there exists within the coronary vessels a separate reflexogenic area comparable in intensity to the aortic arch and carotid sinus.

Author

N65-19149# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
TRACKING PERFORMANCE AS A FUNCTION OF EXPONENTIAL DELAY AND LEARNING Final Report
 Marvin Levine, John W. Senders, Ross L. Morgan, and Louise Doxtater Nov. 1964 20 p refs
 (AMRL-TR-64-104; AD-609811)

Eighty subjects performed a one-dimensional compensatory tracking task for 55 1-minute trials. The subjects were divided into five separate groups and each group performed the task with a different exponential delay between the control input and the display, a dot of light on a cathode ray tube. The

time constants for the exponential delays were 0.015, 0.150, 0.900, 2.100, and 3.000 seconds. The results indicate that time-on-target scores decrease with increasing delay. For delays greater than 0.150 seconds, the decrease is linear. There is a sharper decrease in performance from 0.015 seconds delay to 0.150 seconds delay than for other portions of the function. Increased practice changes the level, but not the shape, of the total function. The effects of delay and learning were within the same range, indicating that a given level of system performance often can be achieved either by altering the delay or by training the operator. However, performance is maximized if delay is reduced and the operator is trained.

Author

N65-19150# Pittsburgh Univ., Pa.

AN EVALUATION OF MULTIPLE TRACKS IN A LINEAR PROGRAM Technical Report, Oct. 1961-Oct. 1962

Robert Glaser, James H. Reynolds, Theodore Harakas, A. G. Holzman, and John S. Abma (AMRL) Wright-Patterson AFB, Ohio, AMRL, Oct. 1964 22 p refs
(Contract AF 33(616)-7175)

(AMRL-TR-64-108; AD-609801)

Two experiments were performed to evaluate multitasking (branching) in a linear program. In experiment one, the multitasking consisted of providing additional cues at each frame for use by those students who felt unsure of their response. Results indicated no significant difference in efficiency between the regular linear program and the multitask program. In experiment two, the multitasking consisted of large frames followed by more detailed frames whenever the student made an error. Large frames were developed by combining an average of three small frames. Again, the results indicated no difference in instructional efficiency between the regular linear program and the multitask program. Although more errors were made on the large-step branching program, performance on criterion tests was as good as for the regular small-step linear program. Although branching seems a reasonable way to accommodate individual differences, the two methods attempted in this research did not show an advantage.

Author

N65-19151# Oregon State Univ., Corvallis. Science Research Inst.

FATE OF UDMH AND MMH IN RATS Technical Report, 1 Jun. 1963-30 Jun. 1964

F. N. Dost, D. J. Reed, and C. H. Wang Wright-Patterson AFB, Ohio, AMRL, Dec. 1964 30 p refs

(Contract AF 33(657)-11757)

(AMRL-TR-64-111; AD-610569)

Many of the applications of hydrazines, especially as rocket propellants and in medicine, give them considerable toxicological importance. The respiratory and urinary excretion by rats of unsymmetrical dimethylhydrazine (UDMH) and monomethylhydrazine (MMH) and their metabolites has been studied by means of radiotracer techniques. At a very low dose, almost 30% of the C^{14} from i.p. administered UDMH- C^{14} appeared as respiratory $C^{14}O_2$ in 10 hours. At a convulsive dose, the conversion of UDMH- C^{14} to $C^{14}O_2$ amounted to slightly greater than 13% at the end of 20 hours. At all doses studied radioactivity appeared in the urine to the extent of at least 50% of the administered UDMH- C^{14} , at the end of 2 days after administration. Rats administered MMH- C^{14} by i.p. injection at 20% of a median lethal dose respired approximately 45% of

the administered radioactivity in 24 hours. At the subconvulsive doses, 40% of the administered radioactivity in MMH- C^{14} was excreted in urine. At a toxic dose the percentage of urinary excretion of C^{14} decreased, but net molar excretion increased slightly.

Author

N65-19152# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio. Biophysics Lab.

A SIMPLE CAPACITIVE DISPLACEMENT MEASURING SYSTEM Final Report, Mar. 1962-Jul. 1964

Lothar O. Hoeft Dec. 1964 23 p refs

(AMRL-TR-64-116; AD-610286)

This report presents the theory, development and performance of a capacitive displacement detector. The detector senses the displacement changes as changes in the capacitance of a probe located near the body whose displacement is being measured. These capacitance changes are converted into frequency changes by placing the capacitance probe in the tank circuit of an oscillator. The frequency changes are converted into voltage changes by standard FM techniques. The capacitance detector has a sensitivity of 30 volts/pfd. When used with a 0.2-cm diameter probe, the displacement sensitivity was 4.78 volts/cm when the probe to surface distance was 0.1 cm. The noise level was low enough so that the system was able to measure displacements of the order of 10^{-5} cm at frequencies below 1000 cps and displacements of the order of 5×10^{-6} cm at frequencies above 1000 cps. The main advantage of this type of displacement detector over others is the ease of construction and adjustment.

Author

N65-19153# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio. Biomedical Lab.

UNDERWATER PRESSURE-COMPENSATED BREATHING CONTROL VALVES FOR PROLONGED WATER IMMERSION Final Report, Feb. 1960-Jun. 1962

Henry W. Seeler Dec. 1964 15 p ref

(AMRL-TR-64-130; AD-611807)

Two water-pressure-compensated breathing devices for prolonged immersion have been designed, fabricated, and tested underwater. One valve is a continuous-flow regulator and the other is a demand regulator. Both valves allow exhalation through a hose directly into the surface atmosphere for air analysis. One of the two valves has been used extensively during prolonged weightlessness simulation tests by immersion.

Author

N65-19154# Institute of Occupational Health, Helsinki (Finland). Dept. of Physiology

TEMPERATURE OF THE HUMAN BODY DURING RAPID ALTERNATE HEATING AND COOLING Final Report, May 1963-Apr. 1964

Pekka Piironen and Erkki Aikas Wright-Patterson AFB, Ohio, AMRL, Dec. 1964 37 p

(Grant AF-EOAR-63-113)

(AMRL-TR-64-131; AD-611805)

Eight nude resting male subjects were immersed in water. The temperature of the bath was varied cyclically from -5° to

42°C. Similar experiments were performed in air with temperatures varying from -5° to 120°C. Skin temperatures oscillated sinusoidally with amplitudes varying from 1° to 10°C and periods varying from 3.75 to 30 minutes. Variations in skin temperature below 30°C did not affect the oesophageal temperature. Sinusoidal variations in skin temperature above 34°C were reflected in nearly sinusoidal alterations in the oesophageal temperature. Sinusoidal variations in oesophageal temperature were accompanied by nearly sinusoidal alterations in rectal, sublingual, and tympanic membrane temperatures, with damping characteristics and phase shifts typical for each site of measurement. Author

N65-19187# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

CONTRIBUTION TO METHODS OF EVALUATING THE ANALGESIC EFFECT OF DRUGS

M. Lukasiewicz and E. Fraenkel 14 Nov. 1964 14 p refs Transl. into ENGLISH from *Cesk. Farm.* (Prague), v. 12, no. 2, Feb. 1963 p 85-89 (FTD-TT-64-55/1+2; AD-452443)

Analgesic effects of drugs and a useful method for studying these effects are described. The method is based on registering and measuring the reaction toward painful stimuli and also respiratory excursions. An evaluation of the analgesic effect of oxycodine chloride is given. The effect of drugs on motion reactions produced by painful stimuli was evaluated on the basis of the number of rats which reacted to stimuli after application of uniform dosages of oxycodine at uniform time intervals, and ED₅₀ of oxycodine chloride at uniform time intervals was established. R.W.H.

N65-19194# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

CHARACTER OF CHANGES IN THE BLOOD IN PERSONS WINTERING AT THE VOSTOK STATION

I. I. Tikhomirov 20 Nov. 1964 7 p Transl. into ENGLISH from *Byul. Sov. Antarkt. Ekspeditsii* (USSR), no. 31, 1961 p 44-47 (FTD-TT-64-285/1; AD-609151)

The relative blood hemoglobin level of nine men wintering in the Russian polar region at average temperatures of -44.5° at average pressure of 470.8 mm Hg increased 62.5% in the first 2 1/2 months, and continued to increase by an average of 10% during the next 4 months. The number of erythrocytes reached the maximum earlier than the amount of hemoglobin, and lagged behind the increase of hemoglobin sufficiently to change the blood color index. Pronounced leucopenia was induced by (1) the living conditions in an almost completely sterilized medium, (2) the depression of the hemopoietic functions by the shaking and vibration of the observation ship, and (3) the insufficiency of ultraviolet radiation. No changes in the blood composition were observed that could be correlated with the season of the polar year, the polar day, or the polar night. G.G.

N65-19197# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

CHANGES IN HIGHER NERVOUS ACTIVITY AND IN CERTAIN VEGETATIVE REACTIONS DURING LONG PERIODS OF RELATIVE ADYNAMIA AND ISOLATION

N. A. Agadzhanian, Yu. P. Bizin et al 23 Nov. 1964 19 p refs Transl. into ENGLISH from *Zh. Vysshei Nervnoi Deyatel'nosti* (Moscow), v. 13, no. 6, 1963 p 953-962 (FTD-TT-64-635/1+2+4; AD-609152)

The work capability of man under conditions of relative adynamia and isolation was determined primarily from the capability to rapidly and accurately differentiate and solve mental problems of varying complexity, while maintaining a high level of movement coordination when performing purposeful actions. Method of experimentation and results are reported. E.E.B.

N65-19211# Chicago Univ., Ill.

RADIATION LABORATORY QUARTERLY PROGRESS REPORT NO. 54

Kenneth P. Du Bois 15 Jan. 1965 101 p refs (Contract AF 41(609)-1693) (AD-610947)

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1. STUDIES ON THE EFFECT OF X-IRRADIATION ON COENZYME A LEVELS OF THE LIVERS OF MICE K. Yam and K. P. Du Bois p 1-14 refs (See N65-19212 09-04)

2. INFLUENCE OF X-IRRADIATION ON THE DEVELOPMENT OF A DETOXIFICATION SYSTEM FOR PHOSPHOROTHIOATES IN THE LIVERS OF RATS F. Kinoshita and K. P. Du Bois p 15-28 refs (See N65-19213 09-04)

3. THE INFLUENCE OF VARIOUS CHEMICAL COMPOUNDS ON RADIATION LETHALITY IN MICE V. J. Plzak, M. Root, and J. Doull p 29-44 refs (See N65-19214 09-04)

4. DOSE-MORTALITY RELATIONSHIPS FOR SEVERAL RADIOPROTECTIVE AGENTS V. Plzak and J. Doull p 45-63 refs (See N65-19215 09-04)

5. STUDIES ON THE RELATIONSHIP BETWEEN SPLEEN OXYGEN TENSION AND RADIOPROTECTION IN MICE A. Hasegawa and H. D. Landahl p 64-69 refs (See N65-19216 09-04)

6. EFFECTS OF ACUTE AND CHRONIC EXPOSURE TO HYPERBARIC OXYGEN ON THE SURVIVAL OF NORMAL AND X-IRRADIATED ANIMALS J. Doull, E. L. Simmons, V. J. Plzak, and E. L. Marks p 70-88 refs (See N65-19217 09-04)

7. APPLICATION OF RADIATION-INDUCED CHANGES IN ADENOSINE TRIPHOSPHATASE ACTIVITY OF HEMATOPOIETIC TISSUES TO A STUDY OF CHRONIC GAMMA IRRADIATION AND THE INFLUENCE OF VARIOUS FACTORS ON ACUTE RADIATION INJURY R. Tardiff and K. P. Du Bois p 89-98 refs (See N65-19218 09-04)

N65-19212 Chicago Univ., Ill.

STUDIES ON THE EFFECT OF X-IRRADIATION ON COENZYME A LEVELS OF THE LIVERS OF MICE

Kei-ming Yam and Kenneth P. Du Bois *In its* Radiation Lab. Quart. Progr. Rept. No. 54 15 Jan. 1965 p 1-14 refs (See N65-19211 09-04)

The concentration of CoA in extracts of livers of normal and X-irradiated mice was determined using an in vitro acetylation system in which CoA was the rate-limiting component. Concentration of CoA in the livers of mice exposed to 700 r whole-body irradiation showed no significant change from normal immediately after irradiation. A 20% decrease occurred 6 hours after irradiation, followed by a 70% increase 2 days after irradiation, a 35% decrease at 8 days, and return to normal by the 10th day. Since the transient effects do not appear to be large enough to interfere with normal metabolic processes which require CoA, these results substantiate previous findings that X-irradiation does not affect the ability of animals to acetylate foreign compounds. M.P.G.

N65-19213 Chicago Univ., Ill.
INFLUENCE OF X-IRRADIATION ON THE DEVELOPMENT OF A DETOXIFICATION SYSTEM FOR PHOSPHOROTHIOATES IN THE LIVERS OF RATS

Florence Kinoshita and Kenneth P. Du Bois *In its* Radiation Lab. Quart. Progr. Rept. No. 54 15 Jan. 1965 p 15-28 refs (See N65-19211 09-04)

The influence of sublethal doses of X-rays on the development of the microsomal enzyme that catalyzes the coupled desulfuration and hydrolysis of phosphorothioates was investigated in mice. The hydrolytic enzyme, as well as the desulfuration system, was found to be inhibited by doses of 400 and 600 r, indicating that the inhibitory effect of radiation on enzyme synthesis extends beyond the area of oxidative microsomal enzymes. Since the hydrolysis occurs at a much more rapid rate than desulfuration, desulfuration is considered to be responsible for the inhibition of the overall system. Daily administration of phenobarbital and nikethamide markedly stimulated the phosphorothioate EPN detoxification enzyme system; the effects of radiation on this stimulatory effect are being investigated. In another series of experiments, chronic exposure to 21.2 or 50 r gamma irradiation per day resulted in no inhibition of the synthesis of the detoxification system even though some animals received large cumulative doses.

M.P.G.

N65-19214 Chicago Univ., Ill.
THE INFLUENCE OF VARIOUS CHEMICAL COMPOUNDS ON RADIATION LETHALITY IN MICE

V. J. Plzak, M. Root, and J. Doull *In its* Radiation Lab. Quart. Progr. Rept. No. 54 15 Jan. 1964 p 29-44 refs (See N65-19211 09-04)

Thirty-five chemical compounds were evaluated for protective activity against the lethal effects of whole-body X-irradiation in mice. Most of the compounds were selected because of a structural similarity to proven radioprotective compounds. The results of toxicity and radiation tests are tabulated for each compound. None of the five quinazoline derivatives tested exhibited significant radioprotective activity, nor did the quinazolinol or quinolinol derivatives. However, two quinolines permitted 10% of the mice to survive an otherwise lethal dose. Slight prolongation of survival time resulted from premedication with three thiazolidine derivatives. Dosage was found to be a significant factor in the radioprotective activity (up to 30% survival) of a thiocarbamic acid derivative and a thiocyanic acid derivative administered prior to irradiation. Two imidazole derivatives were not radioprotective and were quite toxic. The protective and toxic effects of a group of halogenated and methylated nitrosalicylanilides are discussed in relation to the number and position of methyl and chloro groups. A compound, Complamex, introduced in Europe as a therapeutic for radiation sickness, was found to offer no significant protection either before or after lethal X-ray exposure.

M.P.G.

N65-19215 Chicago Univ., Ill.
DOSE-MORTALITY RELATIONSHIPS FOR SEVERAL RADIOPROTECTIVE AGENTS

V. Plzak and J. Doull *In its* Radiation Lab. Quart. Progr. Rept. No. 54 15 Jan. 1965 p 45-63 refs (See N65-19211 09-04)

The dose reduction factor (DRF) was determined for six radioprotective compounds in mice exposed to whole-body doses of 600 through 900 r. These calculations are based on the ability of the compounds to reduce radiation mortality at 30 days after exposure, and are calculated using a programmed

maximum likelihood estimate procedure. Results indicate that the most effective agent tested was 1-thioglycerol (DRF = 1.28). Values of about 1.2 DRF were obtained with 2-benzoxazolethiol, N,N'-bis-(2-hydroxyethyl) dithiooxamide, B,B'-dimethyl aminoethyl isothiuronium sulfate, and N,N'-di(9-xanthenyl) dithiooxamide. The dimethylammonium salt of dimethyl dithiocarbamic acid exhibited a DRF of 1.16. Other studies indicate that increasing the dose of p-aminopropiophenone (PAPP) from 15 to 45 mgm/kgm IP does not increase the radioprotective effect of this compound against whole-body X-ray exposure in mice.

M.P.G.

N65-19216 Chicago Univ., Ill.
STUDIES ON THE RELATIONSHIP BETWEEN SPLEEN OXYGEN TENSION AND RADIOPROTECTION IN MICE
 A. Hasegawa and H. D. Landahl *In its* Radiation Lab. Quart. Progr. Rept. No. 54 15 Jan. 1965 p 64-69 refs (See N65-19211 09-04)

The LD₅₀ values in the mice forced to breathe 10%, 7%, or 4.6% oxygen during X-ray exposure were 620 R, 860 R, and 1000 R, respectively. The LD₅₀ values in the mice maintained at 10% oxygen for a period of 10 minutes, but irradiated under the same conditions as above, were 590 R at 10% and 995 R at 4.6%. Thus, prior administration of 10% oxygen did not alter the survival of these mice. The oxygen tension in the spleen of mice breathing 10%, 7%, or 4.6% oxygen decreased to 36%, 31%, and 10% of normal, respectively. The oxygen tension in the spleens of mice administered 10% oxygen for 10 minutes and subsequently measured while breathing 10%, 7%, or 4.6% oxygen were 26%, 22%, and 12% of normal, respectively. The oxygen tension in the mice given prior treatment with 10% oxygen reached slightly lower levels.

Author

N65-19217 Chicago Univ., Ill.
EFFECTS OF ACUTE AND CHRONIC EXPOSURE TO HYPERBARIC OXYGEN ON THE SURVIVAL OF NORMAL AND X-IRRADIATED ANIMALS

John Doull, Eric L. Simmons, Vivian J. Plzak, and Edna L. Marks *In its* Radiation Lab. Quart. Progr. Rept. No. 54 15 Jan. 1965 p 70-88 refs (See N65-19211 09-04)

The effects of hyperoxia and hypoxia on acute radiation lethality were investigated in mice exposed to 400 to 800 r X-irradiation while in environments from 1/10 to 7 atm of oxygen. Irradiation at high oxygen pressure (up to 90 psig) did not markedly increase radiation susceptibility, indicating the validity of using high oxygen pressure as a research tool in studying radioprotective agents that act through a hypoxic mechanism. In other studies, the ability of various strains of mice, rats, and rabbits to withstand chronic exposure to high oxygen pressure was established. A treatment cycle that permits mice and rats to withstand prolonged exposure (over 60 days) to hyperbaric oxygen is discussed. Young animals were found to be more resistant to the toxic effects of chronic hyperbaric exposure than older animals; this effect does not appear to be related to differences in body size and weight. The symptoms of oxygen toxicity were found to be similar in male and female animals.

M.P.G.

N65-19218 Chicago Univ., Ill.
APPLICATION OF RADIATION-INDUCED CHANGES IN ADENOSINE TRIPHOSPHATASE ACTIVITY OF HEMATOPOIETIC TISSUES TO A STUDY OF CHRONIC GAMMA IRRADIATION AND THE INFLUENCE OF VARIOUS FACTORS ON ACUTE RADIATION INJURY

Robert Tardiff and Kenneth P. Du Bois *In its Radiation Lab. Quart. Progr. Rept. No. 54* 15 Jan. 1965 p 89-98 refs (See N65-19211 09-04)

Adenosine triphosphatase was assayed in the spleen and thymus of weanling and adult male rats exposed to chronic gamma irradiation at 21.2, 45.0, and 50.4 r per day over a period of 10 hours a day for extended time periods. The increases in adenosine triphosphatase activity of the spleen ranged from 133% to 156% of normal; the extent of the increase was dependent upon the total dose of radiation; and the effect was somewhat greater in weanlings than in adults. The data suggest that the enzyme activity increased to a maximum level for a particular dose during the early part of the exposure and was maintained at a constant level thereafter. Although the dose-response relationship needs further study, the results indicate the usefulness of the assay in investigating factors or drugs that influence chronic irradiation response. The enzyme activity of the thymus was not appreciably affected, nor was the development of the phosphorothioate detoxifying system in the liver, at least to 45 days of age. Castration 30 min after X-irradiation did not influence the amount of radiation injury to the spleen and thymus on the third day after irradiation. M.P.G.

N65-19261*# Biosystems, Inc., Cambridge, Mass.

BIOLOGICAL CONTROL SYSTEMS—A CRITICAL REVIEW AND EVALUATION, DEVELOPMENTS IN MANUAL CONTROL

Lawrence R. Young and Lawrence Stark Washington, NASA, Mar. 1965 225 p refs

(Contract NAS2-1372)

(NASA-CR-190) CFSTI: HC \$6.00/MF \$1.25

Recent developments in mathematical models for the human manual control system are reviewed and evaluated as part of a study of the field of biological control systems. Application of control models for investigation of the "fine structure" is stressed, rather than human engineering aspects. Evidence for and against discrete models of the human operator is presented, and a number of such models are compared. The adaptive characteristics of the operator and two basic modeling approaches are presented; several models are reviewed. Detailed discussion is included on correlation of manual response characteristics and physiological data for muscle, leading to models for the postural control and voluntary control system interactions. Author

N65-19271*# National Aeronautics and Space Administration, Washington, D. C.

A CUMULATIVE INDEX TO THE 1964 ISSUES OF A CONTINUOUS BIBLIOGRAPHY ON AEROSPACE MEDICINE AND BIOLOGY

Feb. 1965 562 p Supersedes indexes to SP-7011 and SP-7011(01)-SP-7011(06)

(NASA-SP-7011(07)) CFSTI: HC \$5.00/MF \$2.75

N65-19289# Bryn Mawr Coll., Pa. Dept. of Biology
INFLUENCE OF CORTISONE ON GLYCOGENOGENESIS, ENDOTOXIN LETHALITY AND TRYPTOPHAN PYRROLASE INDUCTION IN COLD-EXPOSED MICE

L. Joe Berry Ft. Wainwright, Alaska, Arctic Aeromed. Lab., Oct. 1964 16 p refs

(Contract AF 41(609)-1764)

(AAL-TDR-64-5; AD-610644)

Mice singly housed and exposed to 5° C are almost as responsive as animals at 25° C in carrying out glycogenogenesis following a single injection of cortisone. An LD₅₀ of endotoxin lowers liver glycogen about equally in mice housed at each of the two temperatures, but the dose for mice at 5° C is one one-hundredth the dose at 25° C. Cortisone given concurrently with the endotoxin prevents glycogen depletion in mice at 25° C but not in those housed at 5° C, except possibly at certain critical doses. Cortisone also fails to induce an increase in liver tryptophan pyrrolase activity in cold-exposed mice, in contrast to those maintained at room temperature, and this failure cannot be ascribed to any alteration in hematin level, the cofactor for the enzyme. These findings are considered as evidence for an impaired capacity for protein (enzyme) synthesis in normothermic animals during acute exposure to cold. Author

N65-19322# Hughes Aircraft Co., Culver City, Calif. Research and Development Div.

JANAIR, JOINT ARMY-NAVY AIRCRAFT INSTRUMENTATION RESEARCH: ANALYSIS OF PICTORIAL DISPLAYS Second Quarterly Progress Report

W. L. Carel Dec. 1964 8 p

(Contract Nonr-4468(00))

(Rept.-2732.01/23; AD-609762)

Progress on the following tasks is discussed: (1) the conception of the pilot's job as a set of hierarchal tasks; (2) the development of a model for target recognition in literal pictorial displays; (3) the development of a graded series of landing and low-level flight hypothetical pictorial displays; and (4) the generation of data to fill in the cells on the chart described previously. E.E.B.

N65-19326# Joint Publication Research Service, Washington, D. C.

METHODS OF DETERMINING GAS EXCHANGE THROUGH THE ENTIRE SURFACE OF THE SKIN

N. M. Petrun' 16 Mar. 1965 14 p Transl. into ENGLISH from the book "Gazobmen Cherez Kozhu i Yego Znachenie Dlya Organizma Cheloveka" Moscow, 1960 p 6-17

(JPRS-29142; TT-65-30523) CFSTI: \$1.00

Modifications of a diver's suit for use as a minimum volume, hermetically sealed system to quantitate gas exchange through the skin are described. Hoses attached to the suit lead to water condensers, carbon dioxide absorbers, a compressor pump, and back to the suit. The suit, which covers all of the subject's body except the face, is completely evacuated and then filled with a known volume of the purified air. Gas samples from the suit are analyzed at the beginning and end of the investigation to determine the increase in carbon dioxide. Among the advantages of this setup are portability, the ability to measure skin respiration with the subject at work as well as at rest, and the possibility of simultaneous measurement of skin respiration, pulmonary respiration, temperature, and gaseous composition of venous and arterial blood. M.P.G.

N65-19327# Joint Publications Research Service, Washington, D. C.

SOVIET RESEARCH ON TEACHING MACHINES

V. Taranov and T. Konyseva 19 Mar. 1965 13 p Transl. into ENGLISH from Nauchno-Tekhn. Obshchestva SSSR (Moscow) no. 8, Aug. 1964 p 18-21

(JPRS-29204; TT-65-30548) CFSTI: \$1.00

The use of technical devices, programed texts, visual aids, and other instruction devices to cope with both the need for mass education and the need to keep abreast with the latest developments in the various disciplines is reviewed. One simple film-strip-type teaching and testing machine is described in detail. M.P.G.

N65-19331# Los Alamos Scientific Lab., N. Mex.
CALCULATION OF RETINAL DOSE DUE TO VISIBLE RADIATION FROM NUCLEAR EXPLOSIONS

Robert D. Cowan 1 Mar. 1965 102 p refs
 (Contract W-7405-ENG.36)
 (LA-3204-MS) CFSTI: \$4.00

Calculation of the maximum energy density received by any portion of the retina due to radiation from an incompletely resolved source requires knowledge of the point-source retinal-image-spread function. For a uniform circular source, one requires more specifically: (1) the point-source effective image radius a_0 , and (2) the normalized integral $g(a/a_0)$ of the image spread function out to the geometrical image radius a . The function g tends to a^2/a_0^2 for small a , to unity for large a , and in intermediate regions may be roughly characterized by its value at $a = a_0$. Experimental measurements on human eyes appear to indicate $a_0 > 6\mu$ and $g(1) \cong 0.5$, but these values are uncertain. A theoretical calculation assuming only diffraction and chromatic aberration gives $a_0 = 3.5\mu$ and $g(1) \cong 0.15$ for large pupils (nighttime conditions) and $a_0 = 4\mu$, $g(1) \cong 0.4$ for small pupils (daytime). Less conservative results, in which effects of other aberrations have been incorporated, are $a_0 \cong 7\mu$, $g(1) \cong 0.5$ for any size pupil—in reasonable agreement with experiment. The dose from a hypothetical high-altitude explosion is calculated to illustrate use of these results. Author

N65-19351# Matrix Corp., Arlington, Va.
THE DEVELOPMENT OF A FAULT ISOLATION/CORRECTION TEXT AND TROUBLESHOOTING DIAGRAMS FOR THE AN/FST-28 SAGE COORDINATE DATA PROCESSOR
 Final Report, Jan.-Dec. 1964
 Edward C. Weiss Bedford, Mass. AFSC, Decision Sci. Lab., Dec. 1964 22 p refs
 (Contract AF 19(628)-555)
 (ESD-TR-64-664; AD-611170)

These materials supplement the Job Proficiency Guide in order to enhance Phase I and Phase II troubleshooting performance. Phase I troubleshooting is defined as fault isolation to a major functional area of the equipment. Phase II troubleshooting is defined as fault isolation within a major functional area to a line replaceable unit. The Phase I diagram utilizes the built-in system readouts. The Phase II diagrams are used in conjunction with a standard oscilloscope. The trouble-shooting procedures terminate in the use of existing logic diagrams. The materials are comprehensive and account for individual differences in technician performance capability. The approach utilized to develop these materials is a further evolution and refinement of a previously developed methodology which was empirically validated in the field. Author

N65-19352# Hughes Aircraft Co., Fullerton, Calif. Ground Systems Group
SHARED SPECTRUM DISPLAY ENHANCEMENT Final Report

James G. Rogers, Marvin H. Detambel, and Ann R. Bien Bedford, Mass., AFSC, Electron. Systems Div., Jan. 1965 65 p refs

(Contract AF 19(628)-3882)
 (FR-65-10-30; ESD-TDR-64-673; AD-611187)

The described illumination system displays portions of the visible spectrum which have been excluded from the ambient light. The resulting tinted illumination is matched in brightness to a standard white light by experimental subjects, and stimulus threshold measurements are made as a function of display intensity for various stimulus and ambient spectra. Certain combinations are found to lower the threshold of detection, indicating enhanced stimulus brightness, whereas others are found to raise the threshold. A close relationship is found between experimental data and results predicted on the basis of previous increment-threshold measurements.

Author

N65-19353# Air Force Systems Command, Bedford, Mass. Decision Sciences Lab.

A TECHNIQUE FOR OBTAINING NON-DICHOTOMOUS MEASURES OF SHORT-TERM MEMORY

James D. Baker Dec. 1964 47 p refs
 (ESD-TR-64-678; AD-610860)

The purpose of this paper is to describe a technique for measuring short-term memory (STM) not based upon dichotomous scoring criteria. The conceptual framework of this technique is derived from current theoretical developments in the measurement of subjective (personal or intuitive) probabilities. An STM feasibility study assessed this approach. Performance measures were obtained using a device that produced response vectors. These response vectors were transformed into equivalent dichotomous scores and uncertainty measures. The derived dichotomous data were compared to data obtained from equivalent, dichotomously scored studies. This comparison showed no deleterious effects on recall when this response mode was used. The uncertainty measures showed well defined evidence of the effects of proactive inhibition in this task. Confidence judgments were derived from the response vectors. These derived confidence judgments were found to be at least as good, in terms of realism of confidence measures, as several existing techniques for obtaining confidence judgments directly. Author

N65-19401*# Joint Publications Research Service, Washington, D. C.

THE UFI-63: A DEVICE FOR STUDY OF HUMAN HIGHER NERVOUS ACTIVITY

B. A. Minin 10 Mar. 1965 6 p refs Transl. into ENGLISH from Zh. Vysshei Nervnoi Deyatel'nosti (Moscow), v. 14, no. 6, 1964 p 1104-1107
 (JPRS-29057; TT-65-30474) CFSTI: \$1.00

Described is a device that measures different parameters of human motor and speech responses simultaneously, and records the latent periods of the motor and speech responses, the duration, and the magnitude of the motor responses. The motor response parameters are measured by the amount of lever displacement through pressure, and a throat microphone is utilized for the latent speech periods. Studies with this apparatus revealed substantial differences between individual subjects and groups of subjects with respect to the parameters of the properties of the main nervous processes. The duration of the motor responses was found to be dependent upon external factors. G.G.

N65-19410# Illinois Univ., Urbana. Coordinated Science Lab.
DETECTION OF RATE CHANGES IN PERIODIC PHENOMENA

R. A. Avner Oct. 1964 17 p refs
(Contract DA-36-039-AMC-02208(E); Grant NSF G-23554)
(CSL-R-235; AD-609698)

In periodic processes, a change in period is a direct indication of a change in its reciprocal, the rate of events. An immediate consequence of sufficiently large changes in period, and hence in rate, will be changes in the number of events within time intervals, e.g., if 10 events occur in one interval and 25 in another, a rate change is assumed to have occurred. It is shown with what probability differences between numbers of observed events within a pair of time intervals may be ascribed to specified changes in rate of a periodic phenomenon. For example, with what probability is the observed difference of (25-10) = 15 events ascribed to an actual rate change of 0, 5, 10, 12, ... events per interval. Such measures are valid for the class of phenomena, such as human heart rate, for which magnitude of rate change is relatively unrelated to base rate.

E.E.B.

N65-19416# Harry Diamond Labs., Washington, D. C.
HUMAN BREATHING PARAMETERS AND COMMERCIAL AUTOMATIC RESPIRATORS

H. H. Straub and G. Thompson 1 Jun. 1964 22 p refs
(HDL-TM-64-23; AD-609732)

During periods of inadequate human respiration, artificial ventilation can satisfactorily assume the function of the patient's breathing mechanisms in most situations. Such ventilation can be administered by mouth-to-mouth techniques, manual methods, or automatic devices. The purpose of this report is to discuss the physiological parameters governing the design of automatic respirators and to review the design of those currently in use.

Author

N65-19423# CBS Lab., Stamford, Conn.
PERSONNEL COMMUNICATIONS IN SPACE. A STUDY OF SPEECH TRANSMISSION AND HELMET COMFORT
Technical Documentary Report, Jul.-Sep. 30, 1964

Benjamin B. Bauer, Alfred L. Di Mattia, and Allan J. Rosenheck Wright-Patterson AFB, Ohio, AF Avionics Lab., Dec. 1964 18 p
(Contract AF 33(657)-10737)
(CLD-1720; AL-TDR-64-175, Suppl. 1; AD-609604)

Two research model helmets were developed that possess good communication capability and increased comfort tolerance. The important features of the helmets are described, along with the development of a simple air supply system for the helmets, which permits their being worn for moderate lengths of time for testing and evaluation of communications and comfort tolerance.

Author

N65-19440# Bell Helicopter Co., Fort Worth, Tex.
COMPARISON OF PERCEPTUAL WORK LOAD IN FLYING STANDARD INSTRUMENTATION AND THE CONTACT ANALOG VERTICAL DISPLAY

D. J. Dougherty, J. H. Emery, and J. G. Curtin Dec. 1964 55 p refs
(Contract Nonr-1670(00))
(D228-421-019, AD-610617)

Reported is an experimental approach to the comparison of visual free time that results in the pilot task when flying standard instruments and when flying the contact analog vertical

display. Measures of performance included absolute integrated error scores of airspeed, altitude, heading and track deviations. Results indicate that, in general, under the control condition (no digits) and the slowest reading rate condition (80 digits per 3-minute period) no statistically significant differences in performance scores existed on the display panels. As the reading rates increased progressively to the fastest rate (360 digits per 3-minute period) performance on the vertical display remained relatively stable, while performance error scores on the standard instruments increased proportionately with increased reading rates.

Author

N65-19461# California Univ., Livermore. Lawrence Radiation Lab. Bio-Medical Research Div.

MAGNETIC FIELDS, VAGAL INHIBITION, AND ACETYLCHOLINESTERASE ACTIVITY

Wei Young and John W. Gofman Feb. 1965 19 p refs
(Contract W-7405-ENG-48)
(UCRL-12389)

The application of a nonuniform magnetic field (4000 to 15000 Oe) produces several effects upon the isolated frog vagal heart preparation, including a consistent decrease in the duration of vagal inhibition, a decrease in cardiac contractility and cardiac work per cycle, and a high frequency of cardiac irregularity arising after cessation of the field. The decreased duration of vagal inhibition is interpreted as an increased rate of acetylcholine hydrolysis. Whatever the mechanism(s) involved, the magnetic field further decreases the vagal inhibition period even after a marked decrease has already been produced by partial replacement of potassium ions by cesium ions in the bathing fluid medium. The data are consistent with, but do not prove, the concept that the magnetic field provokes a major increase in catalytic activity of the enzyme, acetylcholinesterase, at the myoneural junction.

Author

N65-19472# Joint Publications Research Service, Washington, D. C.

RADIOSENSITIVITY OF THE LYMPHOCYTES OF THE PERIPHERAL BLOOD IN VITRO OF ANIMALS OF VARIOUS GENOTYPES

N. I. Nuzhdin and N. N. Kuznetsova 25 Mar. 1965 8 p refs
Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 159, no. 4, 1964 p 923-925
(JPRS-29,282; TT-65-30586) CFSTI: \$1.00

In an effort to establish a criterion that would characterize the radiosensitivity of animals without actually irradiating them, the in vitro sensitivity of the lymphocytes from animals of various genotypes was determined and compared with the LD₅₀ of these animals. Radiosensitivity of the lymphocytes was found to decrease in the following order: rabbit > man > rat > mouse > guinea pig. No significant dependence of lymphocyte radiosensitivity upon sex was observed. The radiosensitivity of the lymphocytes of the animals did not coincide with their ranking by LD₅₀, suggesting that the degree of manifestation of many radiation reactions is not connected with the general radioresistance of the animals.

M.P.G.

N65-19521# California Univ., Los Angeles. Human Communication Lab.

LATERALIZATION OF SOUNDS AT THE UNSTIMULATED EAR OPPOSITE TO A NOISE-ADAPTED EAR

Edward C. Carterette, Morton P. Friedmann, William Lindner (Indiana Univ.), and Jean Pierce (Grinnell Coll.) 1 Oct. 1964 21 p refs
(Contract Nonr-233(58); Grants NSF G-21722; PHS MH-07809)
(TR-24; AD-609456)

Some experiments aimed at clearing up disparated results in work on auditory adaptation led to the search and discovery of conditions of monaural stimulation under which a sound image could be located toward the contralateral, unstimulated ear. The phenomenon helps to clarify divergent experimental results. A tentative model, with testable psychophysiological consequences, is outlined. Author

N65-19540# Joint Publications Research Service, Washington, D. C.

EFFECT OF SPACE FLIGHT ON CREW OF INTERPLANETARY VEHICLE

V. Lebedev 22 Mar. 1965 8 p Transl. into ENGLISH from Nauka i Zhizn' (Moscow), no. 12, Dec. 1964 p 15-18 (JPRS-29217; TT-65-30555) CFSTI: \$1.00

The problems of selecting a psychologically and physiologically compatible crew for long interplanetary space excursions are outlined. Emphasis is placed on the presence of a physician on board the space ship who will be able to carry out direct medical observations of the crew during flight, dispense medication as needed, perform emergency operations under conditions of weightlessness, check the operations of the ecological system, and carry out observations as a zoologist, botanist, and microbiologist on the planet to be studied. G.G.

N65-19567# Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.

PERSONAL HISTORY CORRELATES OF MILITARY PERFORMANCE AT A LARGE ANTARCTIC STATION

E. K. Eric Gunderson, Paul D. Nelson, and James M. Orvick Aug. 1963 9 p refs
(Rept.-64-22; AD-609542)

Relationships between biographical predictors and superiors' ratings were examined for two samples of Navy men who wintered-over at a large Antarctic base. Results for the large station personnel were very similar to those for Navy men studied earlier at smaller stations with respect to the favorability of an age-experience-rank cluster of variables and the unfavorability of past delinquency-truancy record. For a cluster of variables pertaining to needs for avocational activities, however, validity indicators tended in opposite directions for the two populations, low avocational activity being related to better adjustment at small stations. These findings demonstrated significant effects of environmental and organizational factors upon the validity of particular biographical predictors. Author

N65-19602# Pittsburgh Univ., Pa.

LEARNING SET FORMATION IN PROGRAMMED INSTRUCTION Technical Report, Oct. 1961-Oct. 1962

James H. Reynolds, Robert Glaser, and John S. Abma (AMRL) Wright-Patterson AFB, Ohio, AMRL, Nov. 1964 19 p refs (Contract AF 33(616)-7175)
(AMRL-TR-64-114; AD-609802)

Two different orders of three units of programed instruction were administered to groups of students matched on intelligence or relevant achievement tests. Comparisons were

made between groups that were high or average on each matching variable. The hypotheses being tested were that after varied amounts of prior practice in programed instruction, learning set formation would not be demonstrated by the high intelligence and achievement groups, but would be demonstrated by the average intelligence and achievement groups. Only partial support was obtained for each hypothesis. The data indicated the following: (1) In a programed sequence, error rate is a more appropriate measure than achievement for observing learning set formation. (2) Learning set formation is observable in programed instruction for all learners regardless of individual differences. Since reduced error rate was the indication of learning set formation, the phenomenon can be measured only in programs involving a moderately high error rate. (3) A moderately high error rate program which offers opportunity for correction of response errors may be as effective in producing learning as a low error rate program which confirms correct responses. Author

N65-19607# Istituto Superiore di Sanita, Rome (Italy). Laboratori di Fisica

INPUT UNIT FOR IBM 024 PRINTING CARD PUNCH [UNITA D'INGRESSO PER PERFORATRICE IBM 024]

A. Rosati 16 Nov. 1964 17 p In ITALIAN; ENGLISH summary (ISS-64/39)

This report contains the description of an electromechanical circuit. This circuit allows the conditioned and unconditioned reflexes in a cage-enclosed rat under periodical light and voltage pulses to be punched directly on a card. Wiring and diagrams of the whole circuit are reported, and examples and results of experiments with such an apparatus are then presented. Author

N65-19626# Carnegie Inst. of Tech., Pittsburgh, Pa. Graduate School of Industrial Administration

THE EFFECTS OF GOAL DIFFICULTY ON PERFORMANCE: A FIELD EXPERIMENT

Andrew C. Stedry and Emmanuel Kay (GE) Nov. 1964 29 p refs Sponsored by GE
(Contract Nonr-760(24))
(ONR-RM-135; AD-609508)

The effect of goal difficulty on performance was determined by studying two performance areas. These were productivity and rework. The subjects, foremen in a department of a precision parts manufacturing plant, had previously been measured for these two quantities. Goal perception was then varied and the two quantities measured. Detailed discussion of the experiment and results are presented. E.E.B.

N65-19645# Joint Publications Research Service, Washington, D. C.

SPACE FLIGHT PHYSIOLOGY

V. V. Parin et al 17 Mar. 1965 27 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. (Moscow), no. 1, 1965 p 3-22
(JPRS-29156; TT-65-30527) CFSTI: \$2.00

CONTENTS:

1. EFFECT OF IONIZING RADIATION AND SPACE FLIGHT ON SEROTONIN CONCENTRATION IN ANIMAL BLOOD V. V. Parin, V. V. Antipov, M. O. Raushenbakh, P. P. Saksonov, V. S. Shashkov et al p 1-10 refs

2. MECHANISMS OF THE PHYSIOLOGICAL EFFECT OF WEIGHTLESSNESS ON THE HUMAN BODY p 11-20 refs

3. SOME VASCULAR REACTION IN MAN RELATED TO CORIOLIS ACCELERATION R. A. Vartbaronov p 21-26 refs

N65-19646# Sandia Corp., Albuquerque, N. Mex.
PRELIMINARY REPORT ON MICROBIOLOGICAL STUDIES IN A LAMINAR DOWN-FLOW CLEAN ROOM
V. E. Arnold, A. J. Jack, J. G. King, R. C. Marsh, and W. J. Whitfield Jan. 1965 27 p refs
(SC-RR-65-47)

In the original tests performed in the clean room, no bacteria or fungi spores were introduced as test organism. Only those organisms were used which were naturally present in the atmosphere and those which were inadvertently introduced by personnel performing the tests. In the confirmation study, tracer bacteria were introduced in one series as additional proof. Based on the results of the experiments reported here, it can be stated conclusively that the laminar downflow clean room—using filtration and airflow control alone—can control airborne bacteria and fungi as successfully as it can airborne dust and droplets.

Author

N65-19655# California Univ., Berkeley. Sanitary Engineering Research Lab.

NUTRITIONAL AND DISEASE TRANSMITTING POTENTIAL OF SEWAGE-GROWN ALGAE First Progress Report, 1 Nov. 1961-1 Aug. 1964

W. J. Oswald, C. G. Golueke, R. C. Cooper, J. H. Meyers, H. Hintz et al Oct. 1964 99 p refs
(SERL-64-6)

Design and use of a pond in a study of reclaiming organic matter and water through culture of algae in waste waters is reported in detail. The pond covers two-thirds of an acre and is equipped with mixer pumps to maintain a culture 2 to 16 inches deep. Centrifuges, sumps, and dryer drums were installed for algae dewatering and harvesting. The pond has been in operation since 1961. Results are reported on performance of the pond, the presence of various bacteria in the equipment and algae, the difficulties in harvesting, the protein assay of harvested product, and algae feeding of sheep and swine.

J.M.D.

N65-19664# Joint Publications Research Service, Washington, D. C.

TRANSLATIONS ON HYGIENE AND SANITATION

22 Mar. 1965 20 p refs Transl. into ENGLISH of 4 articles from *Gigiena i Sanit.* (Moscow), no. 1, Jan. 1965 p 44 47, 51-58, 71-72
(JPRS-29216; TT-65-30554) CFSTI: \$100

CONTENTS:

1. EXPERIENCE IN CREATING A COMPLEX OF ACOUSTIC CONDITIONS FOR STUDY OF THE EFFECT OF INDUSTRIAL NOISES ON A HUMAN ORGANISM Ye. Ts. Andreyeva-Galanina, S. V. Alekseyev, and G. A. Suvorov p 1-6

2. PROTECTION OF THE ATMOSPHERIC AIR AS ONE OF THE MAIN PROBLEMS OF HYGIENIC SCIENCE AND SANITARY PRACTICE P. P. Lyarskiy and M. K. Nedogibchenko p 7-12

3. FORMS AND METHODS OF WORK PERFORMED BY RADIOLOGICAL GROUPS OF SANITARY EPIDEMIOLOGICAL STATIONS M. A. Sobolevskiy p 13-17

4. AN INCIDENCE OF MERCURY VAPOR CONTAMINATION OF RESIDENTIAL BLOCKS I. D. Krupitskaya and I. L. Pisarevskiy p 18-20

N65-19665# Joint Publications Research Service, Washington, D. C.

RADIATION INJURIES AND RESTORATIVE PROCESSES IN THE CENTRAL NERVOUS SYSTEMS

A. A. Manina 25 Mar. 1965 8 p Transl. into ENGLISH from the book "Lucheverye Porasheniya i Vosstanovitel'nyye Protessy v Tsentral'noy Nervnoy Sisteme" Leningrad, 1964 p 204-209, 226-227

(JPRS-29288; TT-65-30589) CFSTI: \$100

A translation is presented of the conclusion and the table of contents of the cited book. Intrauterine irradiation of rat embryos on the tenth day of embryogenesis is discussed. Dosages ranged from 300 R down to 50 R, and the effects ranged from embryonic death in 4 to 5 days down to moderate hydrocephalus. The table of contents lists chapters covering the normal development of the central nervous system of the rat, the effect of ionizing radiation on the development of the central nervous system of some mammals, the effect of external irradiation of the central nervous system of adult animals, and the effect of internal beta-radiation from ^{32}P on the central nervous system of rats in various periods of its maturation.

D.E.W.

N65-19676# Northrop Space Labs., Hawthorne, Calif.
ANALYSIS AND BIODYNAMICS OF SELECTED ROCKET-SLED EXPERIMENTS

Brooks AFB, Tex., School of Aerospace Med., Jul. 1964 328 p

(Contract AF 41(609)-2317)

(AD-609412)

CONTENTS:

1. BIODYNAMICS OF MAXIMAL DECELERATIONS J. P. Stapp, J. D. Mosely, C. F. Lombard, and G. A. Nelson 161 p refs (See N65-19677 09-04)

2. DYNAMIC RESPONSE OF RESTRAINED SUBJECT DURING ABRUPT DECELERATION G. Nichols 157 p (See N65-19678 09-04)

N65-19677 Northrop Space Labs., Hawthorne, Calif.

BIODYNAMICS OF MAXIMAL DECELERATIONS

J. P. Stapp, J. D. Mosely, C. F. Lombard, and G. A. Nelson In *its Analysis and Biodynamics of Selected Rocket-Sled Expts.* Jul. 1964 161 p refs (See N65-19676 09-04)

The methods and procedures used to expose adult anesthetized chimpanzee subjects to high levels of deceleration during 23 experiments on the rocket sled are presented. Deceleration was accomplished by programmed water inertia braking where trapezoidal patterns were produced. Onsets of deceleration ranged from 450 to 36 000 g per second with plateau levels ranging from 33 to 107 g with duration from 87 to 527 msec. The test sled was accelerated by rockets at a maximum of 7 g up to a maximum velocity of 1194 ft per sec. These experiments show the injurious effects of exposure to acceleration ($-g_x$) correlated with the rate of onset of g, the peak level of g, and the progressive improvement of the restraint

system. One subject exposed to a maximal (96 g at 8500 g/sec onset) $+g_x$ sustained no persistent injury. All the other exposures were $-g_x$. Survival limits of the test subjects are roughly four times the known tolerance limits of human volunteers. The results are presented of a study made to determine the relationship of the many variables involved when a restrained subject is exposed to an abrupt deceleration by the application of a basic forcing function to the supporting vehicle. The studies include the response of the restraints under both static and dynamic loads. Author

N65-19678 Northrop Space Labs., Hawthorne, Calif.
DYNAMIC RESPONSE OF RESTRAINED SUBJECT DURING ABRUPT DECELERATION

G. Nichols *In its Analysis and Biodynamics of Selected Rocket-Sled Expts.* Jul. 1964 157 p (See N65-19676 09-04)

Study of abrupt deceleration of human subject restrained by straps to the decelerating structure is presented. The decelerative forces were similar to crash conditions, and were applied in rectangular, triangular, trapezoidal, and sinusoidal patterns; the straps were of waist, shoulder, and harness designs. The main factors in the experimentation were varied deceleration rates and levels, subject mass and position, and degree of strap stiffness and energy-absorbing capacity. Observations in linear and nonlinear restraint tests were of maximum subject force, rate of buildup, and displacement. It was found, in general, that slack restraint is hazardous. J.M.D.

N65-19689* # Massachusetts Inst. of Tech., Cambridge. Man-Vehicle Control Lab.

STUDIES OF HUMAN DYNAMIC SPACE ORIENTATION USING TECHNIQUES OF CONTROL THEORY Second Semi-annual Status Report

L. R. Young and Y. T. Li Dec. 1964 27 p refs (Grant NsG-577)

(NASA-CR-57292) CFSTI: HC \$2.00/MF \$0.50

The development of research equipment and methods, specific experimental and analytical results obtained using this equipment, and preliminary experiments are summarized. Abstracts on the following research are included: Bang-bang aspects of manual control in high order systems; manual control of an unstable system with visual and motion cues; the roles of men and instruments in control and guidance systems for spacecraft; comparison of relay and manual controllers for systems with high order dynamics; human response to variations of simulated control stick forces; the design and construction of an acceleration cart; and human performance during a simulated Apollo midcourse navigation sighting. E.E.B.

N65-19692* # Naval School of Aviation Medicine, Pensacola, Fla.

THE ULTRASTRUCTURE OF THE OTOLITH ORGANS IN SQUIRREL MONKEYS AFTER EXPOSURE TO HIGH LEVELS OF GRAVITOINERTIAL FORCE Research Report No. 102

Heinrich H. Spoendlin, Harold F. Schuknecht, and Ashton Graybiel 5 Nov. 1964 26 p refs Joint Rept. with NASA (NASA Order R-93)

(NASA-CR-57274)

Eleven squirrel monkeys were exposed to gravitoinertial force of either 5.43 or 10.92 G units for periods up to 10 minutes in different body (head) positions. Three animals died. Gross examination of the brains revealed no pathological

changes. The ultrastructure of the maculae, as revealed by electronmicroscopy, was not altered in any of the animals exposed to high G stress. A detailed account of the findings in these and normal control animals is given and includes some new observations. If the G loadings in this experiment are not exceeded orbital space flights, alterations of the macula would be ascribable to other causes including the prolonged deafferentation associated with weightlessness.

Author

N65-19746* # Naval School of Aviation Medicine, Pensacola, Fla.

COMPARATIVE HISTOLOGICAL STUDY OF THE REINFORCED AREA OF THE SACCULAR MEMBRANE IN MAMMALS

Makoto Igarashi 14 Oct. 1964 17 p refs Joint rept. with NASA

(NASA Order R-93)

(NASA-CR-60389; BuMeD-101) CFSTI: HC \$1.00/MF \$0.50

The reinforced area of the saccular membrane was microscopically investigated in 65 mammalian inner ears, including those of man. A definite reinforced area existed in all of the human ears examined as well as in the ears of the squirrel monkeys; however, in the latter case some of the areas were narrow or of questionable formation. The four-legged mammalian ears studied showed no reinforced area, with exception of those of the flying squirrel. It is possible that, as a stimulus receptor, the function of the saccule in primates differs from that of the saccule in lower mammals. Author

N65-19749* # Massachusetts Inst. of Tech., Cambridge. Engineering Projects Lab.

A SAMPLED-DATA PURSUIT TRACKING MODEL

J. G. Kreifeldt 15 Jan. 1965 27 p refs

(Grant NsG-107-61)

(NASA-CR-57221; DSR-9991-2) CFSTI: HC \$2.00/MF \$0.50

A sampled-data pursuit hand tracking model for the human operator is developed and tested. The model embodies the simplest a priori assumptions about human tracking behavior. The analytical model is presented along with the experimentally determined frequency transfer characteristics of an analog computer built to have the same transmittance as the mathematical model. Generally good agreement was obtained in matching the model's frequency and time domain responses to those of a well-trained human, tracking in pursuit fashion an input power spectrum flat to 0.64 cps. Author

N65-19784# Library of Congress, Washington, D. C. Aerospace Technology Div.

HIGH-ALTITUDE PRESSURE SUITS AND HERMETICALLY SEALED CABINS FOR STRATOSPHERIC FLIGHTS [VYSOTNYYE SKAFANDRY I GERMETICHESKIYE KABINY DLYA STRATOSFERNOY AVIATSII]

V. A. Spasskiy 16 Mar. 1965 17 p Transl. into ENGLISH from Vestn. Vozdushnogo Flota (USSR), no. 5, 1938 p 48-59 (ATD-P-65-13) CFSTI: HC \$1.00/MF \$0.50

Various problems of high-altitude flights are considered in the development and application of hermetically sealed cabins and stratospheric space suits, to guarantee the necessary conditions for the preservation of life and the working capacity of the crew. The basic problems for hermetically sealed cabins are the maintenance of normal breathing conditions for

the crew, protection against cold, and provision of good visibility. The use of space suits for testing of high-altitude aircraft, during flights of multiseat bombers, and in single seater fighters is outlined. The basic problems in designing pressure suits are freedom of movement, regulation of the necessary inside pressure, protection of the flier against cold, and provisions for everyday comfort. It is concluded that the fight for new aircraft ceilings and velocity expansion depends to a certain extent on the success of hermetically sealed body environments. G.G.

N65-19785# Library of Congress, Washington, D. C. Aerospace Technology Div.

SOVIET BIOASTRONAUTICS AND MANNED SPACE-FLIGHT: PROGRAMS, ORGANIZATION, AND PERSONALITIES

18 Mar. 1965 123 p refs

(ATD-P-65-14) CFSTI: HC \$4.00/MF \$1.00

Information on bioastronautics and manned space flight programs obtained from Soviet publications through the middle of 1964, is presented. Topics include: *Table of Biomedical Spaceflights; Experiments in Space*—animal and plant studies; *Space Microbiology; Exobiology; Space-Oriented Radiobiology; Weightlessness; Acceleration; Gas Environment and Respiratory Problems; Chlorella and Higher Plants; Food for Spaceflight; Life Support Systems; Human Engineering; Biotelemetry; and Selection and Training*. A list of active bioastronautic scientific and research organizations, and the names of scientists associated with these organizations are included. G.G.

N65-19805# Gt. Brit. Dept. of Scientific and Industrial Research, Warren Spring Lab.

HUMAN SCIENCES IN INDUSTRY. PART I: ERGONOMICS Annotated Bibliography

Dec. 1964 141 p refs

Ergonomics, methods, facilities, equipment, and general references; systems of men and machines; visual inputs and processes; auditory inputs and processes, including speech production and intelligibility; other sensory inputs and processes; choice and interaction; body measurements, basic physiological capacities, basic and complex motor performance; design of controls and integration with displays; layout of panels and consoles; design of work space, equipment, and furniture; clothing and personal equipment; special environmental factors affecting performance; individual factors, work conditions, and task characteristics that affect behavioral efficiency; training aids and devices; and other areas of psychological research pertinent to ergonomics are the 15 areas covered by this annotated bibliography. E.E.B.

N65-19810# Joint Publications Research Service, Washington, D. C.

FEATURES OF HOMEOSTATIC REACTION DURING HYPOXIC HYPOXIA IN DOGS AT THEIR VARIOUS AGES
I. S. Ugolbayeva 26 Feb. 1965 10 p refs Transl. into ENGLISH from Byull. Eksptl. Biol. i Med. (Moscow), v. 58, no. 9, Sep. 1964 p 34-38

(JPRS-28921; TT-65-30400) CFSTI: \$1.00

Two series of experiments were performed on 80 dogs of various ages (without anesthesia) to determine their resistance to hypoxia. The criterion of resistance was their ability to maintain homeostasis for a prolonged period of time as

determined from the activity of the cardiovascular, respiratory, and thermoregulating system. The first series of experiments exposed the dogs gradually to simulated altitudes of 2000 to 6000 meters and kept them at the maximum height for 30 min to 2 hours; in the second series of experiments the animals were elevated rapidly from 7000 to 16 000 meters. Young puppies up to 18 days old were much less resistant to reduced atmospheric pressure than adult dogs, due to their lack of the bradycardiac phase. It is concluded that the difference in lethal altitudes and exposures as a function of age should be defined as a difference in endurance limits. G.G.

N65-19822# Bureau of Commercial Fisheries, Ann Arbor, Mich.

IRRADIATION PRESERVATION OF FRESH-WATER FISH AND INLAND FRUITS AND VEGETABLES

J. A. Emerson, N. Kazanas, R. A. Grieg, H. L. Seagran, P. Markakis (Mich. State Univ., Lansing) et al Oak Ridge, Tenn., AEC, Aug. 1964 94 p refs Prepared Jointly with Mich. State Univ., Lansing and Mich. Univ.

(Contract AT(11-1)-1283)

(COO-1283-12) CFSTI: \$3.00

The potential value of irradiation pasteurization as a processing method for extending the refrigerated shelf-life of inland fruits, vegetables, and fish is studied. It appears that irradiation pasteurization can significantly extend refrigerated storage life for a given period of time. Among the specific foods mentioned are potatoes—5 krad of gamma irradiation can prevent sprouting of Arenac potatoes for at least 6 weeks; strawberries—mold appearance can be delayed by 4 to 8 days with 200 krad of either gamma or 0.6 MeV electron irradiation; and fish—yellow perch irradiated at 0.0, 0.2, or 0.5 Mr and held at 36°F are quite acceptable organoleptically after 3 weeks of storage. R.W.H.

N65-19833# Deutsche Versuchsanstalt für Luft- und Raumfahrt, Bad Godesberg (West Germany). Institut für Flugmedizin
THE BIOLOGICAL EFFECT OF PROGRESSIVELY APPLIED HIGH PRESSURE. PRESENTATION NO. 1 [DIE BIOLOGISCHE WIRKUNG HOHER STOSSFREIER DRUCKBELASTUNG. I. MITTEILUNG]

O. Wünsche Saint Louis, France, Inst. Franco-Allemand de Rech., 1964 25 p refs (ISL-2/64)

Albino rats underwent steadily increasing dynamic pressure in a pressure chamber up to 46 atm of 0.5- to 0.6-seconds duration and decompression of about 14 seconds after constant pressure level of 2 to 40 seconds. The duration of exposure at maximal atmospheric pressure was found to be essential for the biological tolerance criterium. Static pressures up to 37 atm with short exposure duration followed by 5- to 6-minutes decompression time did not produce any ill effects and even higher pressures were tolerated when pressure increase and decrease were suited to the mechanical breathing conditions. Animals exposed to maximal pressures of prolonged duration showed massive gas bubbles in their venous system at exitus. Transl. by G.G.

N65-19834# Space Technology Labs., Inc., Redondo Beach, Calif. STL Technical Library
EXOBIOLGY: A BIBLIOGRAPHY Research Bibliography No. 52, 1955-Jun. 1964

L. R. Magnolia, S. A. Gogin, and J. A. Turley Oct. 1964 170 p refs
(STL-9990-6737-KU-000; AD-449959)

This bibliography consists of 400 annotated references on the existence and detection of life outside the earth's biosphere, the origin of life, studies of meteoritic "life," and contamination problems. The majority of the items are those published during the period 1955 to June 1964. The abstracts are primarily those written by the individual authors. Author

N65-19871*# Ohio State Univ. Research Foundation, Columbus. Environmental Physiology Lab.

BIOLOGICAL EFFECTS OF PROLONGED EXPOSURE OF SMALL ANIMALS TO UNUSUAL GASEOUS ENVIRONMENTS Semiannual Report, 1 Sep. 1964-28 Feb. 1965

H. S. Weiss and R. A. Wright 1 Mar. 1965 18 p refs /Its Rept.-1492-5

(Grant NSG-295-62)

(NASA-CR-57477) CFSTI: HC \$1.00/MF \$0.50

Groups of mice exposed to a 100% O₂ atmosphere under varying pressures, and with interruptions for periods of air breathing, were found to withstand oxygen toxicity better, due to the reduced oxygen tension in the respired atmosphere. White Leghorn chickens were able to withstand O₂ toxicity of a 100% O₂ atmosphere at atmospheric pressure for as long as two weeks. A method to extract lipids from the rat lung by saline perfusion after exposure to 1 atmosphere O₂ is described; this resulted in an extract containing sphingomyelin, lecithin, and cephalin. Wistar rats maintained in a 79% He-21% O₂ atmosphere for 24 days did not show changes in urine volume or water consumption but food intake was increased. Chickens and rats exposed to a 79% He-21% O₂ environment were found to be sensitized to N₂ leading to a metabolic depression upon transfer to air. Ten hatching trials of chicken eggs incubated in He-O₂ atmosphere resulted in only two normal hatches. Body heat loss tests of men on a bicycle ergometer in a 79% He-21% O₂ atmosphere at 95° F and in varying humidity levels were inconclusive, due to the difficulty of keeping temperature and humidity at the desired level. G.G.

N65-19903*# Stanley Aviation Corp., Denver, Colo.
A STUDY OF THE DYNAMIC MODEL TECHNIQUE IN THE ANALYSIS OF HUMAN TOLERANCE TO ACCELERATION Final Report

Washington, NASA, Mar. 1965 227 p refs

(Contract NASr-37)

(NASA-TN-D-2645) CFSTI: HC \$6.00/MF \$1.25

A single-degree-of-freedom dynamic model was developed. The model consists of a spring-mass analog of the human body that can be used to predict human tolerance to abrupt accelerations. Variations of the basic model can be used to predict the quantitative effects of restraint systems and seat cushions. D.E.W.

N65-19947*# National Aeronautics and Space Administration, Washington, D. C.

MEDICAL ASPECTS OF SPACE FLIGHT

Frank E. Voris [1964] 19 p

(EP-17) GPO: HC \$0.15; CFSTI: MF \$0.50

The major human research problems of the manned space environment are presented. These are respiratory requirements, acceleration forces, weightlessness, radiation hazards, nutrition, waste collection, waste disposal, hazards of strike and penetration of the space ship by meteoroids, and psychological

problems. The requirement for miniaturization of psychophysiological monitoring has greatly accelerated medical technology. The biotechnology, required to develop life support systems for space, results in better equipment for miners, for underwater workers, and for persons who must handle dangerous materials or be in hazardous areas. Many direct and indirect benefits will result from our national technical advancements. E.E.B.

N65-19962*# Brandeis Univ., Waltham, Mass. Dept. of Biochemistry

THE EFFECT OF TETRATHIONATE ON THE STABILITY AND IMMUNOLOGICAL PROPERTIES OF MUSCLE TRIOSEPHOSPHATE DEHYDROGENASES

William S. Allison and Nathan O. Kaplan [1964] 47 p refs Submitted for Publication

(Grant NSG-375)

(NASA-CR-56251) CFSTI: HC \$2.00/MF \$0.50

When three sulfhydryl groups of rabbit, turkey, sturgeon, and lobster triosephosphate dehydrogenases (TPD's), are modified by tetrathionate, the enzymes are completely inhibited. This inhibition can be reversed by the addition of thiols. Losses in immunological activity with specific rabbit antisera prepared against the active forms of the enzymes are observed when the turkey, sturgeon, and lobster TPD's are reversibly and irreversibly inactivated with tetrathionate. The immunological properties of the sturgeon enzyme are only slightly altered when inactivated with tetrathionate, while the immunological properties of the tetrathionate inactivated turkey and lobster TPD's differ significantly from the native enzymes. All of the TPD's studied appear to have no disulfide linkages, since all of the nonmethionine sulfur exists as sulfhydryl groups. It is concluded that the active conformations of the different TPD's are partly stabilized by the three active sulfhydryl groups which react with tetrathionate, but the degree of stabilization varies with the different enzymes. Author

N65-19970# Aerospace Medical Div. Arctic Aeromedical Lab., Fort Wainwright, Alaska.

REVIEW OF RESEARCH ON MILITARY PROBLEMS IN COLD REGIONS

Charles R. Kolb and Fritz M. G. Holmstrom, F. Med. Dec. 1964 170 p refs Presented at 15th Alaskan Sci. Conf., Am Assoc. for the Advan. of Sci., College, Alaska, 31 Aug.-4 Sep. 1964

(AAL-TDR-64-28; AD-457733)

Papers in this symposium pertain to (1) Alaskan physical environment, military construction, and water supply problems, (2) polar region long-distance radio communications, materials engineering and brittle fracture, and traffic possibilities in snow and muskeg, and (3) human safety, clothing, and the effects of isolation in polar regions. J.M.D.

N65-19993# Fordham Univ., New York. Dept. of Psychology

ANALYSIS OF POLYGRAPHIC DATA Final Report

Joseph F. Kubis Griffiss AFB, N.Y., RADC, Jan. 1965 42 p refs (Contract AF 30(602)-2634)

(RADC-TDR-64-101; AD-612034)

Two types of decision situations are characteristic of lie detection investigations: the dependent judgment case in which the examiner, after comparing all records, selects the guilty individual (and possibly accomplices) from among a group of suspects known to include the culprit(s); and, the independent

judgment case, in which a decision of innocence or guilt is made independently for each suspect on the basis of his record alone. The results indicate that neither accuracy of decisions nor confidence in them was diminished under independent judgment conditions. Records of 33 subjects from the simulated theft experiment were selected for further analysis and measurement of the three physiological response systems. These measured characteristics were found to be as accurate as the ratings of the lie detector operators in discriminating between culprit, collaborator, and innocent suspect. Continued research should make it possible to objectify most of the lie detection indices with the aid of a computer. Author

N65-20018# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ABOUT THE ONES WHO REMAIN ON EARTH

O. Gazenko 1 Mar. 1965 16 p Transl. into ENGLISH from Nauka i Zhizn (Moscow), no. 1, 1964 p 26-31 (FTD-TT-64-920/1+2; AD-611860)

The history of aviation medicine as the forerunner of space medicine is sketched. It is pointed out that experiments on animals and investigations with the participation of people have prepared for the flight of the cosmonauts. Therefore, in paying tribute to the cosmonauts, the great contribution by the large group of laborers, engineers, technicians, and scientists, who created aircraft, then the space ships, and developed the technology so responsible for the flights, should not be forgotten. E.E.B.

N65-20024# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

SELF-CONTAINED METHODS OF ANTI-RADIATION AND ANTI-CHEMICAL PROTECTION

J. A. Alkhazov and A. P. Tkachev 15 Feb. 1965 70 p refs Transl. into ENGLISH of the book "Individual'nye Sredstva Protivoradiatsionnoy Protivokhimicheskoy Zashchity" Moscow, Gos. Izd. Lit. po At. Nauke i Tekhn. Gos. Komiteta po Ispol'z. At. Energ. SSSR, 1963 p 1-61 (FTD-TT-64-998/1+2; AD-611745)

Various devices and materials are discussed that can aid in protecting against chemical and radiation hazards. The protectives are described, and methods and rules for their use are discussed. This book was intended as a teaching aid in the training of personnel of civil defense units. D.E.W.

N65-20095# Joint Publications Research Service, Washington, D. C.

MEDICAL AND PSYCHOLOGICAL PROBLEMS IN LONG SPACE FLIGHTS

V. Andreyev 22 Mar. 1965 8 p Transl. into ENGLISH from Krasnaya Zvezda (Moscow), 3 Dec. 1964 p 3 (JPRS-29211; TT-65-30551) CFSTI: \$1.00

The creation of artificial gravity in the spaceship to protect the crew against adynamia induced by prolonged weightlessness in long duration space flights is proposed. Employment of the crew members with mental labor during part of the time would prevent disruption of the mental processes caused by the homogeneity and monotony of impressions during flights in a closed cabin. Radio and television can play a role in eliminating sensory starvation. G.G.

N65-20096# Joint Publications Research Service, Washington, D. C.

THE PERSPECTIVE USES OF INTROSCOPY

P. O. Oshchepkov 22 Mar. 1965 6 p Transl. into ENGLISH from Izv. (Moscow), 5 Feb. 1965 p 3 (JPRS-29212; TT-65-30552)

Present instrumentation, techniques, and applications in the field of introscopy, or direct vision into nontransparent bodies and media, are reviewed. Applications in medicine and industrial quality control are emphasized. E.P.V.

N65-20098# Joint Publications Research Service, Washington, D. C.

RUMANIAN ACHIEVEMENTS IN NEUROCYBERNETICS—ARTIFICIAL INTELLIGENCE

A. Nistor 24 Mar. 1965 8 p Transl. into ENGLISH from Stiinta Si Tehnica (Bucharest), no. 2, Feb. 1965 p 24-25 (JPRS-29267; TT-65-30578) CFSTI: \$1.00

Three electronic and mathematical Rumanian achievements in neurocybernetics—matrix of 49 neurons, artificial voices, and the transmission of information through the synapse—are reviewed. The functioning of a group of neurons was simulated by a model matrix of $7 \times 7 = 49$ neurons. Each neuron was characterized by three values—excitation level, excitability, and permeability of the synapse. Their values were computed by means of recurrence formulas. A machine which recognizes the vowels of the Rumanian language spoken into a microphone, and one which produces an artificial voice capable of pronouncing these vowels is explained. Also, research on the logical diagram of the neuron and transmission of information through the synapses is included. The equivalent logical diagram consists of filters which receive impulses; an adding circuit collects the impulses leaving the filters and sends them to a threshold device, which permits passage if the total exceeds a certain value. E.E.B.

N65-20099# Joint Publications Research Service, Washington, D. C.

MECHANISMS OF TROPHIC EFFECTS

A. K. Podshibyakin 26 Mar. 1965 15 p Transl. into ENGLISH from the pamphlet "O Troficheskoy Funktsii Nervnoy Sistemy" Kiev, Acad. of Sci. Ukr. SSR, 1964 p 40-53 (JPRS-29303; TT-65-30593) CFSTI: \$1.00

It is argued that the trophic function of the nervous system in the organism : animals and man which regulates the biochemical and biophysical bases of life, ensures the existence of complicated complexes of proteinic bodies, their structures, and their harmonious activity. Also, the trophic function ensures optimum development of activity, regulates the intake, assimilation and expenditure of energy producing substances on behalf of the working organ and the entire organism, and conditions the resistance of organs and tissues to different harmfully acting agents of the external and internal environment. The trophic effect is revealed most clearly with irritations of definite strength and quality, with the use of adequate chemical agents, and with a special condition of the organ. Arguments to support these conclusions are taken from the research of many workers over a considerable period of time. E.E.B.

N65-20100# Joint Publications Research Service, Washington, D. C.

REGULATION OF VITAL FUNCTIONS AND CYBERNETICS

N. M. Amoxov 29 Mar. 1965 94 p Transl. into ENGLISH of the book "Regulyatsiya Zhizhennykh Funktsiy i Kibernetika" Kiev, 1964 p 2-115 (JPRS-29330; TT-65-30607) CFSTI: \$3.00

A new view of the organism as a complex system which is dominated by the same laws of control and communications that apply to technical systems is provided by cybernetics. Also, cybernetics offers a new approach to an experiment, the essence of which consists of obtaining a maximum quantity of information with the aid of numerous electronic devices and of the subsequent processing of the results on computers. Cybernetics methods are available to institutions consisting of medical personnel, biologists, mathematicians, and engineers. Such institutes must be equipped with electronic, chemical, and computer apparatus. The benefits of cybernetics to medicine and to mankind are developed. E.E.B.

**N65-20120# Lockheed-California Co., Burbank.
TOXIC CONTAMINATION OF MANNED SPACECRAFT
CABINS: A REVIEW OF THE PROBLEM**

Charles A. Spezia Apr. 1964 87 p refs (LR-17744)

Among the potential hazards of manned space flight is the buildup of toxic contaminants in the cabin atmosphere and in the water supply. Briefs are presented of current research directed toward an effective control system, from the viewpoint of toxicological hazard to a spacecraft crew. Recommendations are included for minimizing contamination, and references from a literature survey are listed. E.P.V.

**N65-20121# Washington Univ., Seattle.
ON THE TRANSFER FUNCTION OF HUMAN SKIN Final
Report**

Konrad J. K. Buettner 1965 27 p refs (Contract DA-18-108-405-CML-666) (AD-611281)

Water and water vapor are believed to move through intact skin surface by glandular secretion such as that of sweat glands, sorption and desorption in the horny layer, and diffusion through the horny layer. Sweating can be partly controlled by low room temperature, atropine, and selection of a body area not prone to sweating. Horny layer sorption and desorption is a saturation process after the skin enters a new environment. After sweat and sorption are evaluated or prevented, there remains a flow of liquid water or vapor through the skin. In the diffusion of skin water exchange the active process or pump seems to be separated from the environment by a barrier which appears to be the part or the whole of the stratum corneum conjunction. R.W.H.

**N65-20132# Joint Publications Research Service, Washington, D. C.
TRANSLATIONS FROM VESTNIK MOSKOVSKOGO UNI-
VERSITETA (HERALD OF MOSCOW UNIVERSITY), 6TH
SERIES, NO. 1 AND 6, 1964**

15 Mar. 1965 49 p refs Transl. into ENGLISH of 5 articles from Vestn. Mosk. Univ. (Moscow), ser. 6, no. 1-6, Jan.-Feb., Nov.-Dec., 1964 (JPRS-29112; TT-65-30508) CFSTI: \$2.00

CONTENTS:

1. SOIL SCIENTISTS AND BIOLOGISTS OF MOSCOW UNIVERSITY AIDING AGRICULTURE p 1-8 ref

2. ROTATION OF SOME TRACE ELEMENTS IN THE SYSTEM SOIL-PLANT L. S. Travnikova p 9-18 refs

3. THE STUDY OF ELECTRIC RESISTANCE AND AUTOLYSIS OF THE SPLEEN TISSUE OF IRRADIATED ANIMALS Ye. V. Burlakova and M. L. Kakushkina p 19-25 refs (See N65-20133 10-04)

4. NEW DATA ON THE SAKHALIN SALMON TROUT HUCHO TAIMEN (PALLAS) M. L. Krykhtin, N. L. Martsinkevichene, and V. D. Spanovskaya p 26-35 refs

5. THE EFFECTS OF GIBBERELLIN ON THE NITROUS AND CARBOHYDRATE CONTENT IN PLANTS I. V. Aseyeva and M. D. Yevdokimova p 36-46 refs

N65-20133 Joint Publications Research Service, Washington, D. C.

THE STUDY OF ELECTRIC RESISTANCE AND AUTOLYSIS OF THE SPLEEN TISSUE OF IRRADIATED ANIMALS Ye. V. Burlakova and M. L. Kakushkina *In its* Transl. from Vestn. Mosk. Univ. (Herald of Moscow Univ.), 6th ser., no. 1 and 6, 1964 15 Mar. 1965 p 19-25 refs (See N65-20132 10-04) CFSTI: \$2.00

The change in electric conductivity and the rate of autolysis of spleen tissue of normal animals and animals irradiated with gamma-rays revealed an increase of low-frequency resistance in the spleen tissue upon prolonged survival. A correlation ratio of 0.89 was found for the increase in low-frequency resistance and the autolysis intensification of the spleen of irradiated rats. This correlation ratio was considered statistically significant and is similar to the correlation of the same processes observed in surviving liver tissue. E.E.B.

N65-20138 Joint Publications Research Service, Washington, D. C.

CHEMICAL PROTECTIVE DRUGS AGAINST IONIZING RADIATION

Ch'i-chick Hsiao *In its* Transl. on Communist China's Sci. and Technol., No. 161 19 Mar. 1965 p 96-105 refs Transl. into ENGLISH from Yao-hsueh T'ung-pao (China), v. 10, no. 8, Aug. 1964 p 337-341 (See N65-20134 10-34) CFSTI: \$4.00

A survey of drugs proven effective against ionizing radiation is presented, and their degree of effectiveness discussed. These include sulfated amino acids, mercaptoalkylamines, thiocarbamide derivatives, thiozolidine aminoalkylthiosulfates, aminodithioformic acids, sulfoxides, and other sulfides. Also discussed are amino acids and amines without sulfur; substances that create lack of oxygen, such as p-aminopropiophenone, sodium nitrate, methylene blue, potassium chlorate, the cyanides, nitriles, oxides, pyrogallol acid, and certain ketone derivatives; chelate compounds; certain vitamins; Rauwolfia alkaloids; and ozone. G.G.

N65-20139# Joint Publications Research Service, Washington, D. C.

TRANSLATIONS FROM BYULLETEN' EKSPERIMENTAL' NOY BIOLOGII i MEDITSINY (BULLETIN OF EXPERIMENTAL BIOLOGY AND MEDICINE), VOLUME 59, No. 1, 1965

23 Mar. 1965 35 p refs Transl. into ENGLISH of selected articles from Byull. Eksptl. Biol. i Med. (Moscow), v. 59, no. 1, Jan. 1965

(JPRS-29250; TT-65-30569) CFSTI: \$2.00

CONTENTS:

1. RATE OF NYSTAGMIC FAST COMPONENT PRODUCED BY RHYTHMIC ELECTRICAL STIMULATION OF THE AMPULLAR RECEPTOR M. M. Levashov p 1-8 refs (See N65-20140 10-04)

2. EFFECT OF IONIZING RADIATION ON THE NEUROSECRETION OF NUCLEI IN THE HYPOTHALAMIC AREA L. A. Andrianova p 9-13 refs (See N65-20141 10-04)

3. IMMUNO-PHYSIOLOGICAL CHANGES IN HOMO-TRANSPLANTATION OF EXTREMITIES IN CANINES N. A. Barbarash p 14-19 refs

4. BONE MARROW TRANSPLANTATION IN RATS WITH M-1 SARCOMA AFTER TREATMENT WITH TOXIC THIOTEP DOSES G. M. Sukhin p 20-26 refs

5. DAILY RHYTHM OF MITOTIC ACTIVITY IN THE REGENERATING LIVER DURING ACUTE RADIATION SICKNESS V. I. Bulgak p 27-32 refs (See N65-20142 10-04)

N65-20140 Joint Publications Research Service, Washington, D. C.

RATE OF NYSTAGMIC FAST COMPONENT PRODUCED BY RHYTHMIC ELECTRICAL STIMULATION OF THE AMPULLAR RECEPTOR

M. M. Levashov *In its* Transl. from Byull. Eksptl. Biol. i Med. (Bull. of Exptl. Biol. and Med.), Vol. 59, No. 1, 1965 23 Mar. 1965 p 1-8 refs (See N65-20139 10-04) CFSTI: \$2.00

Data are presented which show that in experiments where nystagmic reactions were obtained in the frequency range of stimulation, an optimum frequency was found for the fast component of the vestibular nystagmus. The experiments were conducted on adult rabbits, and details of the methods employed are given. E.E.B.

N65-20141 Joint Publications Research Service, Washington, D. C.

EFFECT OF IONIZING RADIATION ON THE NEUROSECRETION OF NUCLEI IN THE HYPOTHALAMIC AREA

L. A. Andrianova *In its* Transl. from Byull. Eksptl. Biol. i Med. (Bull. of Exptl. Biol. and Med.), Vol. 59, No. 1, 1965 23 Mar. 1965 p 9-13 refs (See N65-20139 10-04) CFSTI: \$2.00

Male rabbits were subjected to Co^{60} gamma radiation at the rate of 248 R/min for a total dose of 400 R. When sections of the brain of the control animals were treated with aldehyde-fuchsin, a slight content of a neurosecretory substance was indicated. In irradiated animals studied 2 hours after irradiation, an increase of the neurosecretion was observed. In irradiated animals studied 24 hours after irradiation, a tendency toward the normalization of the neurosecretion was revealed, and in some nuclei it disappeared completely after 72 hours. Initially, after irradiation, a change in the excitability and an increase in bioelectric activity were characteristic of the hypothalamic centers. E.E.B.

N65-20142 Joint Publications Research Service, Washington, D. C.

DAILY RHYTHM OF MITOTIC ACTIVITY IN THE REGENERATING LIVER DURING ACUTE RADIATION SICKNESS

V. I. Bulgak *In its* Transl. from Byull. Eksptl. Biol. i Med. (Bull. of Exptl. Biol. and Med.), Vol. 59, No. 1, 1965 23 Mar. 1965 p 27-32 refs (See N65-20139 10-04) CFSTI: \$2.00

The daily mitotic rhythm in regenerating liver cells during acute radiation sickness of male albino rats weighing 200 to 250 grams is reported. The left lateral and central hepatic lobes were removed in aseptic conditions under ether anesthesia. The change in mitotic activity, binuclear cells in a regenerating liver of nonirradiated and irradiated rats, and percentage correlation of mitotic phases in regenerating liver at different hours of the day are tabulated. It was impossible to discover any regularity which would confirm the presence of daily variations in the number of binuclear cells of non-irradiated and irradiated rats. E.E.B.

N65-20198# Österreichische Studiengesellschaft für Atomenergie G.m.b.H., Seibersdorf (Austria). Reaktorzentrum Seibersdorf

ABOUT METAL IONS BONDING TO NUCLEIC ACIDS [ÜBER DIE BINDUNG VON METALLIONEN UND NUKLEINSAUREN]

H. Altmann, H. Kaendl, H. Frischauf, and K. Kaendl 1964 7 p refs In GERMAN (SGAE-BL-14)

The bonding of Cu^{++} , Ni^{++} , Zn^{++} , Mn^{++} , and Ca^{++} to nucleic acids of the human spleen was investigated, and different affinities for the various metals were established. The Ca^{++} and Mn^{++} ions formed preferred bonds with the phosphate groups of the nucleic acids, Zn^{++} and Cu^{++} showed a very low affinity, and Ni^{++} ions had no specific bonding affinity to the nucleic phosphates. The activity of the introduced copper and zinc ions was most noticeable in the phenol phase of the protein residue. Trans. by G.G.

N65-20324* George Washington Univ., Washington, D. C. RUSSIAN LIFE IN SPACE

Josiah W. Tyson *In its* The George Washington Univ. Mag. 1965 p 6-9 (See N65-20322 10-34) CFSTI: HC \$2.00/MF \$0.50

Biodynamics, which embraces all of those experimental procedures examining the effects of physical stresses on organisms, is discussed. The plants, animals, and materials used in the U.S.S.R. space biology program are tabulated. The Russian interest in psychobiological behavioral studies with animals is summarized. Their use of dogs is understandable in view of their long experience in the use of dogs by Pavlov and others. E.E.B.

N65-20372# Federal Aviation Agency, Washington, D. C. Library Services Div.

AVIATION MEDICAL PAPERS AND REPORTS—A BIBLIOGRAPHY

Oct. 1964 94 p (AM-64-20)

N65-20394 Library of Congress, Washington, D. C. Aerospace Technology Div.

PATTERN RECOGNITION AND THE METHOD OF POTENTIAL FUNCTIONS

In its Foreign Sci. Bull., Vol. 1, No. 1, Jan. 1965 [1965] p 19-22 refs (See N65-20390 10-34)

The problem of teaching automata to separate input situations into classes (the pattern-recognition problem) is analyzed, and the algorithm for its solution is presented on the basis of

the method of potential functions. It is shown that the algorithm can be realized by means of a wide variety of computational schemes, and that the Rosenblatt perceptron is a particular case of the schemes described. The probabilistic approach to the solution of the pattern-recognition problem is also presented. Author

N65-20395 Library of Congress, Washington, D. C. Aerospace Technology Div.

SOVIET RESEARCH ON PHOTOSYNTHESIS

In its Foreign Sci. Bull., Vol. 1, No. 1, Jan. 1965 [1965] p 23-29 refs (See N65-20390 10-34)

A review is presented of basic trends in the Soviet approach to the problems of photosynthesis. Considered is the photosynthetic ability of plants as a process which undergoes adaptations to long-range changes in environmental conditions and which is modified in vivo in the process of evolution according to the availability of natural reducing agents which function as electron (hydrogen) donors in photosynthesis. The concept of differing redox potential levels in a photosynthesizing system is taken as a basis for planning and actual testing of various model systems, e.g., those with pyridine nucleotides and higher-plant and bacterial pigments combined into pairs. In a discussion of the photoexcitation and energy-transfer mechanism, the possibility of a two-quanta process is considered. The results obtained in model systems seem to agree with the known evolutionary concepts. Author

N65-20398# Lockheed Missiles and Space Co., Sunnyvale, Calif.

AN EXPERIMENTAL STUDY OF MANUAL CONTROL DURING TERMINAL RENDEZVOUS UNDER ADVERSE CONDITIONS

D. W. Eliason 1 Feb. 1965 33 p refs
(LMSC-6-65-65-1)

Human performance was measured in an orbital rendezvous task under adverse conditions, e.g., thrust misalignments. An experiment was carried out using four subjects, a control-display cockpit simulator, and a six degree of freedom analog computer mechanization. Two thrust configurations (single vs multiple engine) were studied and compared using performance criteria of fuel consumption and final errors in relative velocity and vehicle orientation. The single-axis attitude-thrust (single engine) configuration was superior with respect to fuel consumption. The three-axis orthogonal-thrust (multiple engine) configuration exhibited higher reliability and smaller final errors in relative velocity and orientation. Author

N65-20401*# Honeywell, Inc., Minneapolis, Minn.
STUDY OF AN ATTITUDE CONTROL SYSTEM FOR THE ASTRONAUT MANEUVERING UNIT Final Report, Dec. 1963-Jul. 1964

W. E. Drissel, R. L. Haines, R. J. Kell, D. N. Lovinger, and D. M. Moses Washington, NASA, Mar. 1965 298 p refs
(Contract NASW-841)

(NASA-CR-198) CFSTI: HC \$6.00/MF \$1.50

This report describes the work done under a study contract whose objectives were to study attitude control systems (ACS's) for astronaut maneuvering units (AMU's) and to define in detail the most nearly optimum system for the application. Detailed definition included identification or specification

of principal components, and specification and drawing layout of all circuitry. The system uses a voice-operated controller for both attitude and translational control, three floated integrating gyros for attitude sensing, a fixed pulse and pseudorate control system, and eight reaction jets. Author

N65-20471*# Texas Inst. for Rehabilitation and Research, Houston.

THE EFFECT OF BEDREST ON VARIOUS PARAMETERS OF PHYSIOLOGICAL FUNCTION. PART III: BIOINSTRUMENTATION

F. W. Vogt, R. J. Lamonte, J. R. Mc Connell, T. O. Hallen, C. Vallbona et al Washington, NASA, Apr. 1965 15 p refs
(Contract NAS9-1461)

(NASA-CR-173) CFSTI: HC \$1.00/MF \$0.50

A bioinstrumentation system for collecting and recording multiple cardiovascular measurements was developed for use in tilt-table tests and for bedside monitoring during bedrest studies. Each component unit of the system is discussed. Author

N65-20472*# Texas Inst. for Rehabilitation and Research, Houston.

THE EFFECT OF BEDREST ON VARIOUS PARAMETERS OF PHYSIOLOGICAL FUNCTION. PART VII: CARDIAC AND VENTILATORY RESPONSE TO THE BICYCLE ERGOMETER TEST

D. Cardus, W. A. Spencer, C. Vallbona, and F. B. Vogt Washington, NASA, Apr. 1965 22 p refs
(Contract NAS9-1461)

(NASA-CR-177) CFSTI: HC \$1.00/MF \$0.50

A study on effects of 14 days bed rest on tolerance to physical work was carried out on 6 healthy subjects. Tolerance was tested with the bicycle ergometer. Oxygen consumption, CO₂ production, pulmonary ventilation, breaths per minute, and frequency of the heart at different work loads, and recovery time of heart rate after cessation of exercise were measured. Results indicate that changes observed after 14 days bed rest in respiratory gas exchange, ventilation, and mechanical efficiency were not significant; heart rate at rest and during exercise was significantly higher after 14-days bed rest. Isometric exercises carried out in a second 14-day bed rest period did not completely prevent the observed changes in heart rate. Author

N65-20473*# Texas Inst. for Rehabilitation and Research, Houston.

THE EFFECT OF BEDREST ON VARIOUS PARAMETERS OF PHYSIOLOGICAL FUNCTION. PART XI: THE EFFECT OF BEDREST ON BLOOD VOLUME, URINARY VOLUME, AND URINARY ELECTROLYTE EXCRETION

F. B. Vogt, W. A. Spencer, D. Cardus, and C. Vallbona Washington, NASA, Apr. 1965 31 p refs
(Contract NAS9-1461)

(NASA-CR-181) CFSTI: HC \$2.00/MF \$0.50

Seven subjects participated in 14-day bed rest studies using controlled diets and careful measurement of intake and output. A 14-day bed rest period was followed by a 14-day recovery period, which in turn was followed by a second 14-day bed rest period to which was added an exercise program. A diuresis and naturesis was observed with bed rest. Day to day variation in plasma volume determination makes interpretation of this measurement difficult. Author

N65-20474* # Texas Inst. for Rehabilitation and Research, Houston.

THE EFFECT OF BEDREST ON VARIOUS PARAMETERS OF PHYSIOLOGICAL FUNCTION. PART XII: THE EFFECT OF BEDREST ON BONE MASS AND CALCIUM BALANCE

F. B. Vogt, P. B. Mack, W. G. Beasley, W. A. Spencer, D. Cardus et al Washington, NASA, Apr. 1965 54 p refs (Contract NAS9-1461)

(NASA-CR-182) CFSTI: HC \$3.00/MF \$0.50

Seven subjects participated in 14-day bed rest studies using approximately 1.0 g calcium diets. A 14-day bed rest period was followed by a 14-day recovery period, which in turn was followed by a second 14-day bed rest period to which was added an isometric exercise program. The exercise program appeared to prevent the loss of bone density which occurred in the bed rest without exercise period. Calcium balance results are difficult to interpret because of short control periods to attain an equilibrium to the test conditions. Author

N65-20526# Army Missile Command, Huntsville, Ala. Redstone Scientific Information Center

THE EFFECT OF PULSATING LIGHT SOURCES ON THE ELECTRICAL ACTIVITY OF THE HUMAN BRAIN

V. A. Il'yanok and V. G. Samsonova Feb. 1965 13 p refs Transl. into ENGLISH from Svetotekhnika USSR, (Moscow), v. 5, 1963 p 1-5

(RSIC-298; AD-611773)

During stimulations by rhythmic light, a change in the frequency spectrum of the EEG is observed as a drastic increase in the amplitudes of frequencies imposed upon and reproduced by the brain, and a decrease in all other frequencies. The spectrum of the EEG in a wide range of frequencies, and its changes at various frequencies, intensities, and durations of rhythmic light flashes, as well as during the simultaneous action of two or more light rhythms differing in frequencies were studied. Experiments were conducted using a photostimulator which provided a practically rectangular form of light pulses with frequencies ranging from 3 to 240 cps. Exposure of the pupil to the screen viewed at an angle of 95° varied from 0.08 to 250 lux and lasted 50 seconds. Results showed that the maximum limit of frequencies reproduced by the brain was not of stabilized intensities but depended on the individual features of each brain, as well as on the intensities of light stimulations, and the duration of the light impulses. E. W.

N65-20529# Denver Research Inst., Colo. Chemical Div. Lab. **INVESTIGATION AND DESIGN OF A REGENERABLE SILVER OXIDE SYSTEM FOR CARBON DIOXIDE CONTROL** Final Report, 1 Apr. 1963-31 Mar. 1964

W. J. Culbertson, Jr. Wright-Patterson AFB, Ohio, AMRL, Dec. 1964 111 p refs /ts Rept.-402

(Contract AF 33(657)-10928)

(AMRL-TR-64-119; AD-612021)

Precipitated carbonate was investigated using test tube samples to establish the merits of this approach to an Ag₂O solids system for CO₂ removal. Moisture catalyzes transport of CO₂ or Ag⁺ through an Ag₂CO₃ layer protecting the Ag₂O from conversion to Ag₂CO₃. At the optimum 1% to 2 1/2% CO₂ over 24 hours are required for good yields, even at 100% humidity. Humidities of 50% result in even slower absorption. Regeneration to Ag₂O may be accomplished in moist partial vacuum at 125°C within 2 hours. The H₂O must reach the decomposing Ag₂CO₃ by penetrating a protective Ag₂O layer

counterflow to the outflowing CO₂. Moisture is not necessary with Y⁺⁺⁺ catalyst at 150°C. Absorption is speeded twofold to threefold with Y⁺⁺⁺ catalyst. At 1/2% CO₂ and 50% humidity, 75% yield is attained within 16 hours. Preliminary work on several other metal oxides showed Zn and Pb to be most promising of these as a substitute for the short-lived Ag₂O. Author

N65-20565# Brown Engineering Co., Inc., Huntsville, Ala. Research Labs.

PHYSIO-MECHANICAL EFFECTS OF ACCELERATIONS ON HUMAN BEINGS WORKING ON A ROTATING ENVIRONMENT

Harry C. Crews, Jr. Nov. 1964 40 p refs

(R-63; AD-610132)

This report presents the results of an examination into the effects of a rotating environment on an enclosed human. The study was initiated due to concern that routine maintenance of radar equipment located in a large rotating room might be impossible, and began with a mechanical analysis of the accelerations on an object in a rotating enclosure. The results of the mechanical analysis agreed well with the experimental results. The primary object of this report is to provide a method of analysis that can lead to methods and procedures for reducing ill effects on humans. While the study was limited to rotation about one fixed axis, it can be extended to apply to a generally rotating environment. The review of applicable acceleration equations starts from the most general case. Author

N65-20566# Imperial Coll. of Science and Technology, London (England). Botany Dept.

PHOTOSYNTHETIC MECHANISMS UNDER SUB-OPTIMAL CONDITIONS Final Scientific Report

C. P. Whittingham 21 Oct. 1964 18 p refs

(Grant AF EOAR-64-1)

(AFOSR-65-0056; AD-610161)

The hypothesis that part of the sucrose formed in photosynthesis is derived through a 2-carbon pathway, with glycollate as an intermediate product, was tested under laboratory conditions. Sucrose degradation was studied in Chlorella and algal samples, to see whether the molecular labeling patterns underwent change. Results showed that glucose is not metabolized to carbon dioxide and reformed in photosynthesis; relative predominance of glycollate appeared to be effected by photosynthetic conditions. It was concluded that sucrose formed in the experiments did not show changes in labeling pattern which would be consistent with formation of sucrose from glycollate. J. M. D.

N65-20588 Joint Publications Research Service, Washington, D. C.

EXPERIMENTS ON FISH OVULATION INDUCED BY STEROIDS

Chang Hsing, Hsiang-hsiung Li, and Tzu-i Chang. In its Transl. on Communist China's Sci. and Technol., No. 162 23 Mar. 1965 p 33-38 refs Transl. into ENGLISH from K'O-hsueh T'ung pao (Peking), no. 1, 1965 p 79-81 (See N65-20582 10-34) CFSTI: \$2.00

Artificial stimulation of ovulation in fish and the effects of steroids, especially progesterone and suprarenal cortin, in the ovulating cycle are reported. Results supported the theory that

there is an interrelationship between the suprarenal gland cortin and ovulation, as there is between ovulation and stress reactions. It was shown that progesterone promotes the maturing of ova and ovulation. The experiments also explained the complementary action of pituitrin and cortin. Also, the economics of using corticosteroids for promotion of fish ovulation was discussed. E.E.B.

N65-20599# Joint Publications Research Service, Washington, D. C.

TRANSLATIONS FROM MEDITSINSKAYA RADIOLOGIYA (MEDICAL RADIOLOGY), VOLUME IX, NO. 12, 1964

B. P. Kalashnikov et al 2 Apr. 1965 60 p refs Transl. into ENGLISH from Med. Radiol. (Moscow), v. 9, no. 12, 1964 (JPRS-29410; TT-65-30641) CFSTI: \$3.00

CONTENTS:

1. RADIOISOTOPIC DIAGNOSIS OF EYE TUMORS AND WAYS OF ITS IMPROVEMENT B. P. Kalashnikov and Yu. A. Bystrova p 1-12 refs

2. PROBLEMS OF RADIATION HYGIENE IN ISOTOPIC MYELORADIOMETRY N. I. Nikberg and V. Kh. Frenkel' p 13-19 refs

3. RADIATION INJURY DURING IRRADIATION OF VARIOUS PARTS OF THE HEAD Yu. D. Skoropad p 20-28 refs

4. THE COURSE OF RADIATION SICKNESS AGAINST THE BACKGROUND OF THE STIMULATING ACTION OF RADIOPROTECTIVE AGENTS ON THE HYPOPHYSIO-ADRENAL SYSTEM V. Ye. Ryzhenkov and A. M. Stashkov p 29-35 refs

5. THE MECHANISM OF PROTECTIVE EFFECT OF NIBUPHIN ON THE HEART IN ACUTE RADIATION SICKNESS IN RATS B. S. Berezovskiy and I. V. Zaikonnikova p 36-40 refs

6. THE RADIORESISTANCE AT VARIOUS STAGES OF ACUTE RADIATION SICKNESS I. G. Akoyev p 41-49 refs

7. THE EFFECT OF IRRADIATION ON THE VASCULAR PERMEABILITY AND MUCOPOLYSACCHARIDE AND SEROTONIN LEVELS IN THE BLOOD G. A. Chernov, Z. I. Sheremet, and R. V. Lenskaya p 50-57 refs

N65-20613# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering

FORCE ANALYSIS OF WALKING AT REDUCED GRAVITY Dennis Edward Beebe (M.S. Thesis) Aug. 1964 112 p refs (MECH/GA-64-1; AD-610233)

In order to determine the primary surface reaction forces exerted by a man walking under reduced gravity, the vertical and longitudinal surface reaction forces were measured for a number of walking subjects, both on the ground and at reduced gravity levels between 0.1 and 1.0 g. Experiments included the study of normal walking, tempo variation, and pressure suit effects. Both reaction forces varied almost directly with gravity. The lower walking limit observed for the unsuited subjects was 0.12 g, where the limiting factor appeared to be the reduced magnitudes of the forces themselves rather than a change in their ratio. Author

N65-20625*# California Univ., Berkeley. Space Sciences Lab. **ENZYME ACTIVITY IN TERRESTRIAL SOIL IN RELATION TO EXPLORATION OF THE MARTIAN SURFACE** Semi-annual Progress Report, 1 Jul. 1964-1 Feb. 1965

J. O. Falkinham, J. Skujins, and A. D. Mc Laren 9 Mar. 1965 65 p refs /ts Ser. No. 6, Issue No. 8 (Grant NsG-704)

(NASA-CR-57585) CFSTI: HC \$3.00/MF \$0.75

Three studies whose objective is to develop qualitative tests for the various enzyme activities in soil and to adapt the most sensitive of these to procedures compatible with radio-telemetry from the Moon and Mars are reported. The first is a survey of the biochemistry of terrestrial soils with special emphasis on possible applications to detection of extraterrestrial life, prelife, or evidence of extinct life. The second is a survey of the enzymes found in terrestrial soils, the reactions they catalyze, and the methods of determining their activities. The soils examined all exhibited significant levels of substrate degradation, so modifications of the techniques used in enzyme assays to fit a Martian life probe are being evaluated. The third study reports initial results regarding urease activity in saturated urea solutions in preparation for urease measurements in soil, and also the results of a literature survey on the subject. Urease determination using C^{14} labeled urea as the substrate is discussed, as well as the design of a self-contained $C^{14}O_2$ counting chamber and the development of a solid-state radiation detector. M.P.G.

N65-20726# Rocketdyne, Canoga Park, Calif.

SOURCES OF INFORMATION ON THE EFFECTS OF HUMAN PERFORMANCE ON PRODUCT AND SYSTEMS EFFECTIVENESS

George A. Peters and Frank S. Hall 15 Feb. 1965 186 p refs Revised (RH-3398-J)

This is a comprehensive compilation of books, symposia, bibliographies, data, specifications, standards, handbooks, organizations, and other sources of information on ergonomics, system safety, bioastronautics, life sciences, aerospace medicine, reliability engineering, quality assurance, engineering psychology, personnel subsystem, and maintainability, with emphasis on human factors engineering. More than 1000 separate sources of information are listed or described. These are basic or primary references which provide access to the supporting literature, specify what should be done, describe how various functions might be accomplished, illustrate what was accomplished, or serve as design standards. Author

N65-20753*# Litton Systems, Inc., St. Paul, Minn. Applied Science Div.

MARS BIOLOGICAL SAMPLE COLLECTION AND PROCESSING STUDY PROGRAM Final Report, 15 Nov. 1963-31 Dec. 1964

D. A. Lundgren, V. W. Greene, and M. J. Grundtner 1 Feb. 1965 183 p ref Prepared for JPL /ts Rept.-2703

(Contracts NAS7-100; JPL-950771)

(NASA-CR-57724) CFSTI: HC \$5.00/MF \$1.25

The following sample acquisition and biological support studies are discussed: description of soil samples, and of analytical techniques; evaluation of microbial assay techniques, detection criteria, and sampling techniques and concepts; processing studies; and related biological experiments. Results are summarized and recommendations made. An appendix pertaining to sample acquisition as a problem in exobiological research contains a brief review of the existing interfaces between sampling and life detection, followed by more detailed discussions of the biological, mechanical, and statistical considerations involved. G.G.

N65-20828# Joint Publications Research Service, Washington, D. C.

RADIOLYSIS OF A DEXTRAN-DERIVED BLOOD-PLASMA SUBSTITUTE AND EFFECT OF Co^{60} ON MUSCLE ATP AND INORGANIC PHOSPHORUS

S. V. Markevich et al 18 Mar. 1965 19 p refs Transl. into ENGLISH of 2 articles from Vestsi Akad. Navuk Belarusk. SSR, Ser. Biyal. Navuk (Minsk), no. 3, 1964 p 107-118 (JPRS-29183; TT-65-30541) CFSTI: \$1.00

CONTENTS:

1. RADIOLYSIS OF POLYGLUCIN SOLUTION S. V. Markevich, S. S. Kharamonenko, P. Te. Gorbunov, Ya. V. Stakhovskiy, A. I. Valakhanovich et al p 1-9 refs

2. ACTION OF RADIOACTIVE COBALT (Co^{60}) ON THE CONTENT OF ADENOSINETRIPHOSPHORIC ACID AND ACID-SOLUBLE INORGANIC PHOSPHORUS IN THE CARDIAC AND SKELETAL MUSCLES OF RATS N. M. Labanova p 10-16 refs

N65-20829# Joint Publications Research Service, Washington, D. C.

ON THE PHYSIOLOGICAL MECHANISM OF THE EFFECT OF WEIGHTLESSNESS ON THE ORGANISM OF MAN I. I. Kas'yan and V. I. Kopanev 5 Apr. 1965 14 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. (Moscow), no. 1, Jan.-Feb. 1965 p 10-17 (JPRS-29433; TT-65-30652) CFSTI: \$1.00

Generalized scientific data on the physiological reactions of animals and of man under conditions of weightlessness are discussed and evaluated in an attempt to define their mechanisms. The observed sensory, motor, and vegetative disruptions of the organism's functions are attributed to the reduction of the weight of the tissues and organs and consequently the change in signaling from the receptors, resulting in reduced blood pressure, an accumulation of blood in the venous channels, probable diminished venous blood circulation from the upper part of the body, changes in the biomechanics of external breathing, and interruption of motion coordination. The averaged effect of weightlessness is considered as a consequence of the change of the functional state of the central nervous system, and the cooperative work of the analyzers. G.G.

N65-20831# Joint Publications Research Service, Washington, D. C.

NEW FRONTIERS OF SPACE MEDICINE

6 Apr. 1965 17 p Transl. into ENGLISH of 4 articles from Med. Gazeta (USSR), 16 Oct. 1964 p 3 (JPRS-29456; TT-65-30662) CFSTI: \$1.00

CONTENTS:

1. ABOARD THE "VOSKHOD" Ye. Zab'yalov and V. Popov p 1-5

2. A UNIQUE EXPERIMENT IN OUTER SPACE I. Khazen and F. Kosmolinskiy p 6-10

3. FEEDING IN FLIGHT p 11-12

4. EXTRATERRESTRIAL LIFE AND TERRESTRIAL SCIENCE p 13-14

N65-20832# Joint Publications Research Service, Washington, D. C.

THE LIMITS OF DIFFERENTIATED INHIBITION

Ye. G. Guseva 6 Apr. 1965 13 p refs Transl. into ENGLISH from Zh. Vysshei Nervnoi Deyatel'nosti (Moscow), v. 14, no. 4, 1964 p 687-694

(JPRS-29461; TT-65-30667) CFSTI: \$1.00

A study of the dynamics of the limits of differentiation inhibition by gradual increase in the physical strength of inhibitory stimulation has shown that the threshold of inhibition began, in dogs, with disinhibition of differentiation. However, another phenomenon was also observed, where there was no disinhibition; on the contrary, when the intensity of the inhibitory stimulus was increased, there was a decrease in salivation in response to the inhibitory stimulus. At first, the absence of disinhibition when the physical strength of the inhibitory stimulus was increased was considered to be a coincidental phenomenon, but with accumulation of experimental data it became obvious that its appearance followed a visible pattern; it was observed in 4 of 12 dogs. Author

N65-20833# Joint Publications Research Service, Washington, D. C.

MECHANISMS OF GENERAL COMPLICATIONS ENSUING FROM THERMAL INJURIES

B. A. Saakov 8 Apr. 1965 23 p Transl. into ENGLISH from the book "Mekhanizmy Obshchikh Oslozhneniy Termicheskikh Travm" Kiev, Gosmedizdat p 259-276

(JPRS-29494; TT-65-30683) CFSTI: \$1.00

Results of a literature survey and experimental investigation of the injurious effect of thermal traumas and ensuing pathological processes on the organism are reported. The role of functional disorders of the nervous system in the pathogenesis of burn shock, hyperthermia, and hypothermia was established, using the electrophysical method. E.P.V.

N65-20834# Joint Publications Research Service, Washington, D. C.

IMPORTANT EXPERIMENTS IN OUTER SPACE

Boris Yegorov 9 Apr. 1965 8 p Transl. into ENGLISH from Aviats. i Kosmonavt. (Moscow), no. 12, Dec. 1964 p 34-38 (JPRS-29521; TT-65-30700) CFSTI: \$1.00

The Russian physician-astronaut describes his own and his crew's biocurrent recordings during orbit. Observed were electrocardiograms, respiratory movements of the chest, seismocardiograms, electrical potentials of the brain appearing during voluntary and involuntary eye movements, parameters characterizing coordination of movements during tracing of figures and letters, a curve characterizing muscular efficiency in performing rhythmic motions of the hand, frequency of pulse and breathing, arterial pressure, gas interchange, and other phenomena. Instrumental methods of investigation were combined with observations to determine the condition of the astronauts. The sense of sight during flight was not changed but maximal arterial pressure was lowered under weightlessness conditions with no change in the minimum pressures. Certain variations in the morphological structure of the blood, in the water-salt exchange, etc., were of a transient and nonspecific nature. G.G.

N65-20835# Joint Publications Research Service, Washington, D. C.

SEMINAR: SOME PROBLEMS OF BIOCYBERNETICS AND THE APPLICATION OF ELECTRONICS IN BIOLOGY AND MEDICINE

K. A. Ivanov-Muronskiy and V. G. Mel'nikov. 5 Apr. 1965. 28 p. refs. Transl. into ENGLISH from the publ. "Seminars. Nekotoryye Probl. Biokibernetiki i Primeneniye Elektron. v Biol. i Med." Kiev. 1964. p 3-33.

(JPRS-29435; TT-65-30654) CFSTI: \$2.00

Electronarcosis and its use in medical practice were studied experimentally. The concept of anesthesia induction by electrical current is discussed in detail. Tests were done on dogs to determine the effects of electronarcosis on respiratory and cardiovascular systems, and on brain tissue, and the conclusion was that electronarcosis is not permanently harmful if used under certain well-defined conditions. Electronarcosis was successfully used on two patients. Based on these results an instrument was designed to create anesthesia through application of FM signals in such a way as to avoid tactile irritation and seizures. Another method was then devised, which was based on pulsations arising under influence of interference of high-frequency current, and which was then used in surgery on human cancer; this interference-electronarcosis technique was concluded to be the best of the present methods. J.M.D.

N65-20895# Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.

CHIMPANZEE SERUM BIOCHEMIC ALTERATIONS DURING AND FOLLOWING 24 HOURS OF RESTRAINT Interim Report, Nov. 1961-May 1963

Ralph A. Scott, Jr. Oct. 1964. 26 p. refs
(ARL-TR-64-12; AD-457895)

Chimpanzee response to 24 hours of restraint was measured by biochemical serum alterations. Serum values in blood drawn immediately before, immediately after, 24 hours post-, and for a limited number of cases, 7 days postrestraint, are compared. The values are analyzed for significant deviations in relation to age, sex, and duration of restraint. The most pronounced changes with restraint occurred in potassium, inorganic phosphate, and total cholesterol. Author

N65-20896# Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.

CHIMPANZEE HEMATOLOGIC ALTERATIONS DURING AND FOLLOWING 24 HOURS OF RESTRAINT Interim Report, Nov. 1961-May 1963

Ralph A. Scott, Jr. Oct. 1964. 16 p. refs
(ARL-TR-64-13; AD-458350)

Chimpanzee response to 24 hours of restraint was measured by determining hematologic alterations in blood drawn immediately before, immediately after, and 24 hours postrestraint. The values are analyzed for significant deviations in relation to age, sex, and duration of restraint. Pronounced alterations with restraint occurred in most of the formed elements determined. The formed elements of the blood support a hypothesis that a state of dehydration exists during restraint. Author

N65-20897# Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.

CHIMPANZEE URINE BIOCHEMIC ALTERATIONS DURING 24 HOURS OF RESTRAINT Interim Report, Nov. 1961-May 1963

Ralph A. Scott, Jr. Oct. 1964. 20 p. refs
(ARL-TR-64-14; AD-458366)

Chimpanzee response to 24 hours of restraint was measured by alteration in urine biochemical values. Values in four

consecutive 6-hour urine collections are compared. The values are analyzed for significant deviations in relation to age, sex, urine volume, and duration of restraint. The most pronounced changes with restraint occurred in urine potassium, chloride, epinephrine, total catechol amines, 17-ketosteroids, and in the urine volume. Author

N65-20926# Library of Congress, Washington, D. C. Aerospace Technology Div.

DATA ON THE SOVIET SPACE PROGRAM, ANALYTICAL SURVEY

17 Mar. 1965. 29 p. refs

(ATD-P-65-11; AD-459646) CFSTI: HC \$2.00/MF \$0.50

Selected Soviet articles on guidance systems, human factors in interplanetary flight, pressure suits and spaceship cabins, trends in aerospace vehicle design, and extracts from papers on bioastronautics, simulated space flights, communications, and space vehicles are presented. E.E.B.

N65-20959# Intellectron Corp., New York.

ELECTRO-STIMULATION TECHNIQUES OF HEARING

Henry K. Puharich and Joseph L. Lawrence. Griffiss AFB, N.Y., RADC, Dec. 1964. 79 p. refs
(Contract AF 30(602)-3051)

(ER-0038; RADC-TDR-64-18; AD-459956)

A transdermal hearing system was developed using modulated electrical carrier signals to stimulate sound perception. Current version of this system uses amplitude-modulated alternating-current carrier signals capacitively coupled to the skin of the head and neck. The transdermal system produces undistorted sound perception in normal humans and improvement in those with impaired hearing. It also elicits rudimentary signal discrimination in totally deaf humans. The transdermal stimulation of audition was extended to dogs made deaf by cochlear destruction as evidenced by positive conditioned reflex experiments. Author

N65-20981*# California Univ., Los Angeles. Brain Research Inst.

EFFECT OF SPACE ENVIRONMENT ON CIRCADIAN RHYTHMS OF PLANTS, FOR THE PURPOSE OF DEFINING AND VERIFYING AN EXPERIMENT SUITABLE FOR USE IN A BIOSATELLITE Semiannual Report, Sep. 1, 1963-Mar. 1, 1964

J. D. French and T. Hoshizaki. 1 Mar. 1964. 9 p.

(Grant NsG-528)

(NASA-CR-53457) CFSTI: HC \$1.00/MF \$0.50

The previous findings on pinto bean leaf movements were confirmed. Time lapse recording has shown that there are no significant changes in the rhythmicity of the detached leaf from that of leaves attached to whole plants. Under greenhouse conditions, detached leaves which were rooted in vermiculite have been transplanted and grown in potting soil for as long as 6 weeks. *Neurospora* has been cultured on a low nutritional media. A reduction of growth rate of 1/2 inch to 3/4 inch per day was accomplished when specimens were placed in a constant temperature of 20°C. A 2-pound biopack was developed for orbital flight. The biopack is 2 1/2 inches in diameter and 7 inches long. Simulated orbital runs have been made with the biopack. E.E.B.

N65-21039# Mayo Clinic, Rochester, Minn.
BLOOD OXYGEN CHANGES INDUCED BY FORWARD (+ G_x) ACCELERATION Technical Report, 1 Apr. 1962-1 Nov. 1964

Natalio Banchemo, Lucille Cronin, A. Clark Nolan, and Earl H. Wood Wright-Patterson AFB, Ohio, AMRL, Dec. 1964 23 p refs

(NASA Order R-43; Contract AF 33(657)-8899; Grants NIH G-H-3532; AHS-CI-10)

(AMRL-TR-64-132; AD-613331)

Six dogs under morphine-pentobarbital anesthesia were exposed to forward accelerations of 2, 4 and 6G for 1 minute and 6G for 3 minutes while in the horizontal, 15° head-up 15° head-down positions breathing room air. Exposures to 6G were repeated breathing 99.6% oxygen. Oxygen saturation and opacity at 800 millimicrons of blood were recorded continuously by cuvette oximeters. Pulmonary arterial-venous shunting was estimated from blood oxygen saturations. No systematic changes in femoral artery oxygen saturation occurred at 2G, while a 4% decrease was observed at 4G. Decreases occurred at 6G averaging 11% at the end of the 60-second exposure. Return to control (1G) values was nearly complete 50 seconds after the exposure. Oxygen inhalation delayed but did not prevent the desaturation. These decreases are believed due to pulmonary arterial-venous shunting. The average increase in pulmonary arterial-venous shunt over 1G values estimated at the end of 60-second exposures to 6G when breathing air, was 17%. Values for shunts at 6G, when breathing oxygen, were similar. Author

N65-21048# Pittsburgh Univ., Pa.
REPETITION AND SPACED REVIEW IN PROGRAMED INSTRUCTION Final Report, Oct. 1961-Oct. 1962

James H. Reynolds, Robert Glaser, John S. Abma, and Ross L. Morgan (AMRL) Wright-Patterson AFB, Ohio, AMRL, Dec. 1964 35 p refs

(Contracts AF 33(616)-7175; OE-2-10-057)

(AMRL-TR-64-128; AD-612738)

Experiments one and two covered a one-semester course in general science at junior high school level. In experiment three, a 1280-frame portion of the total course was used. The results of experiments one and two indicate that the programed course was at least as effective as the conventional instruction in terms of both learning and retention after 15 weeks. The linear program was superior to conventional instruction on some measures. The spiral program offered few advantages over the regular linear program. In experiment three, spaced review produced significant increases in learning which persisted, and even increased, through a 3-week retention interval; repetition did not produce increased learning or retention. The general conclusions are (1) repetition of instructional materials above the usual level in a linear program is not beneficial; (2) spaced review is potentially beneficial; and (3) some techniques of obtaining spaced review offer disadvantages that equal or outweigh its potential advantages. Author

N65-21059# Naval Air Engineering Center, Philadelphia, Pa. Aerospace Crew Equipment Lab.

METABOLIC MECHANISMS OF MAN IN THE FULL PRESSURE SUIT. PHYSIOLOGICAL COST OF DONNING A FULL PRESSURE SUIT

Edwin Hender, Donald W. Dery, and Neil Miller 1 Dec. 1964 25 p refs

(NAEC-ACEL-527; AD-609937)

Experienced subjects donned a full pressure suit under conditions of time and donning space limitations. Direct and indirect measures of physiological cost were made using oxygen consumption and heart rate, respectively. Approximately 1 kcal of energy per kg of body weight was expended in the donning task. Donning volumes as small as about 7 times the volume of the subject's body accommodated the dressing procedure with no apparent increases in donning time nor in energy expenditure. Suit fit was found to have an important effect on both effort and time required for donning. Author

N65-21073# Argentina. Comision Nacional de Energia Atomica, Buenos Aires.

RADIOPHOSPHORUS METABOLISM IN THE STATE OF ORTHOPHOSPHATE AND PYROPHOSPHATE IN CHLORELLA VULGARIS [METABOLISMO DEL RADIOFOSFORO AL ESTADO DE ORTOFOSFATO Y PIROFOSFATO POR LA CHLORELLA VULGARIS]

Leopoldo J. Anghileri 1964 8 p refs In SPANISH *Its Informe* No. 126

Chlorella vulgaris was cultured in media containing orthophosphorus and pyrophosphorus. Glucose was added to some of the cultures to determine its influence on the algae's phosphorus absorption. The phospholipid fractions from the pyrophosphorus medium containing glucose absorbed half as much as the culture without glucose. The orthophosphorus medium extracts contained more. An interesting observation is that in the presence of glucose and in a pyrophosphorus medium, the DNA is considerably reduced. R.N.A.

N65-21074# Argentina. Comision Nacional de Energia Atomica, Buenos Aires.

THE METABOLISM OF PHOSPHOR IN CHLORELLA VULGARIS. I: INCORPORATION OF P-32 BY LIPID FRACTION UNDER HETEROTROPHIC CONDITIONS [METABOLISMO DEL FOSFORO POR LA CHLORELLA VULGARIS. I: INCORPORACION DE P-32 A LA FRACCION LIPIDOS EN CONDICIONES HETEROTROFICAS]

Leopoldo J. Anghileri 1964 12 p refs In SPANISH *Its Informe* No. 127

Chlorella Vulgaris was cultivated in a medium containing assimilable phosphorus in the form of orthophosphate ($P^{32}O_4H_3$) to determine the amount of phosphorus incorporated by the lipid fraction under normal and heterotrophic (cultivated in the presence of glucose) conditions both with and without illumination. Phosphorus was more readily absorbed by some phospholipids than by others which is explained by preferential isotopic interchange. Light and darkness also affected phosphate transfer. *Chlorella's* development was especially slow in darkness and in the absence of glucose. R.N.A.

N65-21091 Joint Publications Research Service, Washington, D. C.

ON THE PERIODICITY OF LATENT PERIODS OF THE "INEXTINGUISHABLE" CONDITIONAL FUGITIVE REFLEX AND THE ATTEMPT OF A CYBERNETIC INTERPRETATION

C. Hecht and M. Peschel In *its* East German Publ. on Cybernetics 12 Mar. 1965 p 24-32 refs Transl. into ENGLISH from Acta Biol. Med. Ger. (East Berlin), v. 13, no. 4, 1964 p 504-512 (See N65-21089 10-34) CFSTI: \$2.00

The application of mathematical frequency analysis to the results obtained for individual rats showed the existence of frequencies in all animals in given established procedure. Frequencies prevailed with periods ranging within 6, 7, 8 minutes and within 13, 14, 15 minutes; the manner of reaction of the individual animals permitted a classification into three groups. These groups were interpreted as adaptational types. Various possibilities of a cybernetic interpretation were discussed. The hypothesis of a linear regulating circuit with additional engagement by a governing organ seems most probable.

E.E.B.

N65-21092# Joint Publications Research Service, Washington, D. C.

INTERACTION BETWEEN SUPRALIMINAL AND EXTERNAL INHIBITION

V. N. Andreyeva 6 Apr. 1965 11 p refs Transl. into ENGLISH from Zh. Vysshei Nervnoi Deyatel'nosti (Moscow), v. 14, no. 4, 1964 p 695-700

(JPRS-29460; TT-65-30666) CFSTI: \$1.00

The possibility of disinhibition of supraliminal inhibition by external stimuli was investigated. Experiments were conducted on four dogs using the classical salivation-alimentary method to study the distinctive features of interaction between supraliminal and external inhibition. Disinhibition, as well as summation, was observed. The result of interaction between supraliminal and external inhibition depended mainly on the initial functional status, i.e., on the intensity of supraliminal inhibition. The physical intensity of extraneous signals was not the deciding factor determining the result of interaction between supraliminal and external inhibition. The ability to undergo disinhibition under the influence of extraneous stimuli is a sign common to both internal and supraliminal inhibition.

E.E.B.

N65-21144# Electronic Systems Div., Bedford, Mass. Decision Sciences Lab.

INVESTIGATIONS OF ACOUSTIC EFFECTS UPON VISUAL SIGNAL DETECTION

William H. Watkins and Carl E. Feehrer Dec. 1964 28 p refs (ESD-TR-64-557; AD-612768)

Several patterns of aural white noise of moderate intensity were presented in four forced-choice experiments to investigate acoustic influence upon visual detection. When noise was present, but not continuous, the temporal properties of its bursts or interruptions bore a regular relation to the observation intervals involved in the visual task. Detection rates were highest when bursts of noise coincided with observation intervals. Rates were somewhat higher when there were interruptions at observation intervals than when noise was continuous. Acoustic facilitation was reduced to a (statistically) nonsignificant level when the visual signal was made spatially coincident with one of four light flashes. Practice effects were present over the full span of the longest of these experiments, but were not obvious in each of the experiments. Author

IAA ENTRIES

that slowing was initiated before the appearance of the electroencephalogram slow wave. An arousal pattern appeared after the termination of hypoxia by the readmission of oxygen; the greater the partial pressure of the resupplied oxygen, the more marked was the arousal activation. Possible mechanisms for this phenomenon are discussed. The flicker fusion frequency fell rapidly in the early stages of hypoxia; 5 min after reoxygenation this frequency was almost completely recovered. This coincided with recovery on the electroencephalogram. (Author) W. M. R.

A65-18695

NEW APPROACHES IN CORRELATIVE STUDIES OF BIOLOGICAL ULTRASTRUCTURE BY HIGH-RESOLUTION ELECTRON MICROSCOPY.

H. Fernández-Morán (Chicago, University, Chicago, Ill.). *Royal Microscopical Society, Journal*, vol. 83, June 1964, p. 183-195. 52 refs.

AEC Contract No. AT (30-1)-2278; National Institutes of Health Grants No. B 2460; No. C 3174; No. NB 04267; Grant No. NSG 441-63.

Historical account of developments in the application of light microscopy, electron microscopy, and low-angle X-ray diffraction techniques to biological studies. Investigations of the fine structure of the nerve myelin sheath, of crystalline insect-virus inclusions, mitochondrial membranes, negatively stained solubilized lipids, and of E. Coli pyruvate dehydrogenation complex are discussed. Development of powerful modern techniques of electron microscopy and X-ray diffraction has begun to require significant improvements in preparation techniques; quick freezing to liquid helium temperatures will probably be used to achieve such improvements. A cryo-electron microscope with superconducting electromagnetic lenses is described and illustrated; such an instrument is now being developed in laboratories at the University of Chicago. Nine high-resolution micrographs are presented. D. H.

A65-18708

ORGANIC SYNTHESIS IN ALGAL CELLS SEPARATED INTO AGE GROUPS BY FRACTIONAL CENTRIFUGATION.

Constantine Sorokin (Maryland, University, Dept. of Botany, College Park, Md.).

Archiv für Mikrobiologie, vol. 49, 1964, p. 193-208. 15 refs.

NASA-supported research.

Study of the synthesis of organic matter in cells of the green, high-temperature alga *Chlorella* 7-11-05 separated from a nonsynchronized population into fractions of predominantly small or large cells by centrifugation. Rates of synthetic activity were determined as changes in optical density, dry weight, and packed volume of cells in several suspending fluids and under various light intensity conditions. It was found that synthetic activity of the smaller (younger) cell fraction is invariably higher than that of the larger (older) cell fraction, provided a reasonably good separation of cells into size fractions is achieved during centrifugation and the difference between size composition of these fractions was maintained throughout observation. The decline in synthetic activity of cells in the course of cell development, previously observed on synchronized cells, is thus substantiated on nonsynchronized populations in the absence of the light: dark synchronizing agent and is therefore held to be characteristic of normal cell development. A. B. K.

A65-18839

RESPONSES OF HUMAN ELECTROENCEPHALOGRAPH TO INDUCED HYPOXIA AT THE ALTITUDE OF 6,000 METER AND 8,000 METER IN THE LOW PRESSURE CHAMBER.

Haruo Ikegami and Iwao Takase (Aero-Medical Laboratory, Tachikawa, Japan).

Japanese Journal of Aerospace Medicine and Psychology, vol. 2, Dec. 1964, p. 1-9. 9 refs. In Japanese.

Observed reaction of seven healthy adults when their oxygen supply was cut off at altitudes of 6000 and 8000 m in the low-pressure chamber for 15 and 6 min, respectively. Continuous electroencephalograms were taken before, during, and after the resulting hypoxia. Slight desynchronization was observed before the appearance of the slow wave. This is considered to be due to a chemoreceptor-induced activation effect on the brain stem reticular system. Slowing occurred gradually during the hypoxia, and sometimes attained the hypersynchronous state. The desynchronization was more apparent in hypoxia at 6000 m than at 8000 m. Marked individual variations were observed in the degree of slowing and in the length of the latent period. An automatic band analyzer revealed

A65-18842

DYNAMICS OF RESPIRATORY GASEOUS EXCHANGE UNDER HIGH OXYGEN.

Hisashi Saiki (Tokyo Jikeikai Medical University, Dept. of Physiology, Tokyo, Japan).

Japanese Journal of Aerospace Medicine and Psychology, vol. 2, Dec. 1964, p. 32-40. 6 refs. In Japanese.

Investigation of the dynamic changes in a number of functions of three subjects (guinea pigs) exposed to high oxygen concentrations at 1 atm from the beginning to the culmination in death. The survival times of the subjects were 74 hr, 11 min; 88 hr, 2 min; and 93 hr, 59 min. Thus, all the subjects died on the fourth day of O₂ exposure. The subjects ate the proffered diet and drank water ad libitum, yet, at the time of death, their body weights had decreased to 89.2, 91, and 94% of the pre-exposure values. From the beginning of the 2nd day to the beginning of the 3rd, the oxygen uptake decreased dramatically to 56.2, 59.7, and 70% of the pre-exposure values. The oxygen metabolism takes the form of two plateaus with an inhibitory valley in the middle. The subject with the widest valley and the highest succeeding plateau survived longest. In all cases, the oxygen uptake fell to zero just prior to death. The CO₂ excretion followed the same trend as the O₂ uptake. There was no evidence of accumulation of CO₂ in the body. The respiratory quotient (RQ) rose or fell to >1 or <1, depending on the increase or decrease in the O₂ uptake. (Author) W. M. R.

A65-18812

EVALUATION OF CHEMICAL DIETS AS NUTRITION FOR MAN-IN-SPACE.

Milton Winitz, Jack Graff, Neil Gallagher, Anthony Narkin, and Daniel A. Seedman (United Aircraft Corp., United Technology Center, Life Sciences Laboratory, Sunnyvale, Calif.). *Nature*, vol. 205, Feb. 20, 1965, p. 741-743. 9 refs. Grants No. NSG 285; No. NSG 510.

Clinical investigation of chemical diets possessing a high degree of flexibility by virtue of their liquid nature and the fact that they are composed solely of highly purified and discrete chemical constituents, each of which may be added to, omitted from, or varied in the diet at will. Diets of this type are unique in that their essential and nonessential nitrogen is provided in the form of highly pure L-amino acids and in that they are administered as single crystal-clear solutions which are nutritionally complete in themselves. Results obtained over a 19-week experimental period revealed that chemical diets sufficed to maintain the subjects with no untoward physiological or psychological responses; there were no complications or toxicity effects. Actually, it is reported, the subjects exhibited marked improvement in physical status and psychological outlook. It is noted that fecal elimination in all individuals was strikingly reduced: several of the subjects experienced smaller than normal bowel movements at regular intervals of 5 to 6 days. Another observation was the progressive decrease of the total serum cholesterol from an average baseline value of 226 mg% to an average value of 151 mg% after 19 weeks. It is concluded that chemical diets can overcome a number of limitations inherent in alternative space food sources now being evaluated. The advantageous characteristics include: (1) high nutritive efficacy in ultracompact form - 1 ft³ of the diet, as a 75% solution in water, will provide a 154-lb astronaut with all his required essential and nonessential nitrogen, salts, vitamins, and fats, in addition to his estimated requirement of 2830 calories/day, for a period of 1 month; (2) complete water solubility - provides advantages in the administration of the diets in liquid form under conditions which will not permit the use of solids; (3) low bulk - induces low fecal residues and mitigates the critical problem of solid-waste disposal; (4) complete nutritive flexibility - allows alteration at will of the amino acid ratios, carbohydrate content, and the levels of all other components, thereby making it possible to tailor formulations to the

specific dietary needs of the individual astronaut; (5) complete digestibility - provides dietary components in the most elemental form in the event of digestive-system disturbances; and (6) good storage stability, both in the solid state and as an aqueous solution. W.M.R.

A65-18837

FEEDING THE ASTRONAUTS.

Robert A. Nanz (NASA, Manned Spaceflight Center, Houston, Tex.). *Spaceflight*, vol. 7, Mar. 1965, p. 59, 60.

Discussion of problems attendant upon the feeding of astronauts in spaceflights. Owing to the weight limitation existing on board a space vehicle and the conditions of weightlessness prevailing during the time of orbiting, a need arises for the development of freeze-dehydrated and bite-size ready-to-eat foods. In addition to the problem of developing such foods, there is also the problem of storage and that of handling the container while eating. An attempt is being made to develop a container or food system which a man can operate while wearing gloves, if necessary. A container that dispenses one item at a time as needed is being studied. A.B.K.

A65-18841

STUDIES ON COGNITION OF BODY TILT IN CLOSED CABIN.

Fushiro Motobayashi, Sukeo Sugimoto (Nagoya University, Research Institute of Environmental Medicine, Nagoya, Japan), Zensho Yokose, and Mitsuyo Ito (Nagoya University, Dept. of Psychology, Nagoya, Japan).

Japanese Journal of Aerospace Medicine and Psychology, vol. 2, Dec. 1964, p. 24-31. In Japanese.

Four experiments to determine whether visual or proprioceptive variables dominate in the judgment of visual and postural verticality: (1) determination of the cognition thresholds of body tilt to the right, left, front, and back, with four different postures - standing erect, lying face up, sitting at ease, and sitting erect - under light and dark conditions; (2) subject's estimate of the degree of body tilt under light and dark conditions; (3) study of the effect of a fixed head position on the judgment of body tilt; and (4) study of the effect of visual cues of three kinds - luminescent lines at angles of 45 and 90 to the floor and a true vertical line - on the subject's estimate of body tilt. It is found that the judgment of body inclination is a function of both muscle tension and visual cues. The vestibular function does not appear to have much effect, although it may play an important role in the righting reflex. (Author) W.M.R.

A65-19149

THE MAN AMPLIFIER.

Neil J. Mizen (Cornell Aeronautical Laboratory, Inc., Buffalo, N. Y.).

Astronautics and Aeronautics, vol. 3, Mar. 1965, p. 68-71. 6 refs.

Description of the fabrication and testing of a full-scale, wearable, nonpowered exoskeletal structure (the Man Amplifier) to determine whether it is feasible to surround a person by such a device when he is to perform useful work tasks. All tests performed indicated that the wearer was neither so hampered in his movements nor so uncomfortable as to be unable to perform typical work tasks. Tests included determinations of performance decrement with varying restrictions in joint mobility and of percentage time that exoskeletal joints were in various position-velocity-acceleration states. A logical next step is considered to be to design and construct a research version of a working powered exoskeleton which would establish the feasibility of muscular and skeletal augmentation inherent in the Man Amplifier approach. Self-contained power would not be necessary in the research model; power could be supplied from a stationary source by means of an umbilical cord. D.H.

A65-19518

THE AUTOMATED BIOLOGICAL LABORATORY - THE SCIENTIFIC AND ENGINEERING OBJECTIVES.

Temple W. Neumann (Philco Corp., Aeronutronic Div., Newport Beach, Calif.).

IN: AIAA UNMANNED SPACECRAFT MEETING, LOS ANGELES, CALIF., MARCH 1-4, 1965 (AIAA PUBLICATION CP-12).

[A65-19498 09-31]

New York, American Institute of Aeronautics and Astronautics, 1965, p. 224-229.

Review of the present technological capability of the US space program of exploring the planets, particularly Mars, for extra-terrestrial life. Specifically, the Automated Biological Laboratory (ABL), a planetary landing payload concept currently under study by the Aeronutronic Division, Philco Corp., under contract to the Office of Bioscience Programs, NASA, is reviewed. The scientific objectives, techniques for the detection and classification of extra-terrestrial life, and the system problems are discussed. The most difficult single problem in the design of the ABL is identified as the selection of the most meaningful characteristics of life. The importance of the program from the philosophical, scientific, and engineering viewpoints is considered to be apparent. An integrated ABL is suggested as the optimum approach to such a search. It is concluded that no fundamental technological barrier appears to exist that would prevent the U.S. from accomplishing this mission in the early 1970's. M.L.

A65-19519

ANIMAL TEMPERATURE SENSING FOR STUDYING THE EFFECT OF PROLONGED ORBITAL FLIGHT ON THE CIRCADIAN RHYTHMS OF POCKET MICE.

R. G. Lindberg, C. J. De Buono and M. M. Anderson (Northrop Corp., Northrop Space Laboratories, Bioastronautics Laboratory, Hawthorne, Calif.).

IN: AIAA UNMANNED SPACECRAFT MEETING, LOS ANGELES, CALIF., MARCH 1-4, 1965 (AIAA PUBLICATION CP-12).

[A65-19498 09-31]

New York, American Institute of Aeronautics and Astronautics, 1965, p. 230-235.

Presentation of a proposed experiment to study the diurnal periodicity, or circadian rhythms, of organisms by placing pocket mice in deep space orbital flight. It is noted that the causal relationships of these rhythms to chemical, physical, biochemical, or environmental phenomena is still argumentative. If man's circadian rhythms are in any way coupled with terrestrial cues, it is emphasized that the probability of his satisfactory performance on prolonged space missions will be low. The experiment definition, design, and package concept, and the data handling system are discussed. The main function of the data handling system is shown to be the measurement of temperature from each animal. This is to be achieved by the use of implanted, microminiature temperature telemeters, developed at the Northrop Space Laboratories, which accurately transmit mouse body temperatures to within 0.05°C. M.L.

A65-19770

AERONAUTICAL AND COSMONAUTICAL BIOMETEOROLOGY [BIOMETEOROLOGIA AERONAUTICA Y COSMONAUTICA].

Manuel Palomares Casado.

Revista de Aeronáutica y Astronáutica, vol. 24, Nov. 1964, p. 921-929. In Spanish.

Discussion of the interrelationships among biometeorology, anthropological engineering, medicine, and psychotechnics. The subjects discussed are: (1) applications by means of anthropological engineering, medicine, and psychotechnics; (2) atmospheric and cosmic psychophysiological influences, (3) space bioelectricity and biomagnetism, (4) influence of ionization, and (5) other influences of an electrical and electromagnetic nature. M.M.

A65-19838

EMBRYO DEVELOPMENT AND CHICK GROWTH IN A HELIUM-OXYGEN ATMOSPHERE.

Harold S. Weiss, Ronald A. Wright, and Edwin P. Hiatt (Ohio State University, College of Medicine, Dept. of Physiology, Environmental Physiology Laboratory, Columbus, Ohio).

Aerospace Medicine, vol. 36, Mar. 1965, p. 201-206. 15 refs. Grant No. NSG 295-62.

Investigation of the embryonic development and chick growth of fertile White Leghorn eggs which were incubated in approximately 79% He and 21% O₂, with up to 0.5% residual N₂ in a sealed plastic isolator in which temperature, relative humidity, O₂, and CO₂ were controlled. Live, healthy chicks were hatched in He-O₂, but only half as many as in a comparable air system. The poorer He-O₂ hatch was due mainly to late embryonic death. Hatching time was similar, but the He chicks were 8% smaller. During

development, He embryos showed neither gross defects, nor differences in dry weight, or in total nitrogen, but He eggs lost 27% more weight. During an additional four weeks in their respective atmospheres, chick growth and hematology were similar, but the He birds consumed up to 16% more feed, and had higher heart and respiratory rates. It is considered that increased conduction of heat in He may be responsible for the observed effects.

(Author) F. R. L.

A65-19839

MOVEMENT OF RESPIRED GAS IN MANNED SPACE ENCLOSURES.

D. A. Keating, K. Weiswurm, and G. W. Filson (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).

Aerospace Medicine, vol. 36, Mar. 1965, p. 206-210. 10 refs.

Description of research on the movement and dispersion of respired gas in manned space enclosures during weightless flight. The research is based upon mathematical analysis, and human and model experimentation. The effects of atmospheric movement produced only by respiration and diffusion are analyzed. This is the condition that exists in manned spacecraft without forced atmosphere movement during weightless flight for a sleeping or restrained astronaut. The determination considers an astronaut in an infinite space enclosure. The exhaled gas is considered to be injected into the infinite medium as two pulsating jets from a fixed source. Due to viscosity and momentum effects, the exhaled gas is slowed down by the surrounding fluid until the only means of gas dispersion is due to molecular diffusion. The amount of CO₂ which is inhaled is dependent upon the position and dispersion of the previous exhalations due to the effects of momentum, viscosity, and diffusion. The techniques of dimensional analysis and model theory are used to provide an experiment in the Earth laboratory which represents the movement and dispersion of respired gas in a weightless space enclosure.

(Author) F. R. L.

A65-19840

EFFECTS OF HYPERBARIC OXYGEN ON SOME COMMON PATHOGENIC BACTERIA.

A. G. Towers (London, University, Institute of Orthopaedics, Stanmore, Middx, England) and W. I. Hopkinson (Vickers Group, Research Establishment, Sunninghill, Berks., England).

Aerospace Medicine, vol. 36, Mar. 1965, p. 211-213. 8 refs.

Investigation of the effect of hyperbaric oxygen at 2 atm absolute and 37°C on a number of micro-organisms pathogenic for man. Short intermittent exposures of the cultures had little effect on the morphology or colonial characteristics, and long, continuous exposure to hyperbaric oxygen failed to reveal true oxygen-dependent mutants, but did produce a number of variant colonies.

(Author) F. R. L.

A65-19841

HUMAN FACTORS IN "CAUSE UNDETERMINED" ACCIDENTS.

Emmert C. Lentz (USAF, Norton AFB, Calif.).

Aerospace Medicine, vol. 36, Mar. 1965, p. 214-222. 32 refs.

Review of USAF aircraft "cause undetermined" accidents occurring over a four-year period. These accidents are considered to indicate that the man-machine complex tends to fail during the stressful phases of flight. High-speed impact and loss of control are factors common to many in this series. Man's limitations, and specifically his ability to maintain orientation, are major problems in the operation of high-performance aircraft. Aircraft performance has advanced to the place where exploration of the operational parameters is reserved for the test pilot. Comment is made that experienced combat pilots may still be novices with respect to the vagaries of the aircraft they fly. Safety of flight is enhanced by the division of duties with a qualified copilot.

(Author) F. R. L.

A65-19842

SOME HUMAN FACTORS CONSIDERATIONS FOR ORBITAL MAINTENANCE AND MATERIALS TRANSFER.

Carl R. Adams and George Hanff (Lockheed Aircraft Corp., Lockheed-California Co., Human Engineering and Maintenance Design Dept., Burbank; Douglas Aircraft Co., Inc., Biotechnology Branch, Santa Monica, Calif.).

Aerospace Medicine, vol. 36, Mar. 1965, p. 223-230. 18 refs.

Preliminary task analysis to determine the performance levels of a maintenance worker in space, and to evaluate some of man's space-adaptive capacities. The preliminary analysis establishes certain tentative considerations expected to influence the maintenance mission. Basic among these are: (1) shuttle vehicle design, (2) design of vehicle upon which the task is to be performed, (3) degree of automation involved in performance of the task, (4) accessibility of task area, (5) techniques for task performance, and (6) effectiveness of tool design or modification. Certain basic assumptions are also enunciated; the worker would operate in an anthropomorphic suit, and would possess the necessary motor skills and visuomotor coordination. The shuttle vehicle and the vehicle upon which the task would be performed would be joined by some sort of docking technique.

F. R. L.

A65-19843

AIRBORNE TRANSMISSION OF INFECTION IN LOW GRAVITATIONAL FIELDS - A BRIEF REVIEW.

Robert G. Loudon (Texas, University, Southwestern Medical School; Woodlawn Hospital, Dallas, Tex.).

Aerospace Medicine, vol. 36, Mar. 1965, p. 230-232. 11 refs.

Institute of Allergy and Infectious Diseases Grant No. AI 05027-OIAI.

Review of aerial transmission of infection, with reference to reduction of the limiting factors of gravitational fallout of larger particles and atmospheric dilution of smaller particles in space-flight. It is considered apparent that airborne particles containing micro-organisms will be a form of atmospheric contamination requiring consideration in any prolonged spaceflight project. Control measures for this type of contamination will be necessary as part of the general contamination control required in a life-support system.

F. R. L.

A65-19844

EFFECTS OF POSITIVE G ON CHIMPANZEES IMMERSSED IN WATER.

Kenneth R. Coburn (U.S. Naval Air Engineering Center, Aerospace Crew Equipment Laboratory, Philadelphia, Pa.), Peter H. Craig (Pennsylvania, University, School of Veterinary Medicine, Philadelphia, Pa.), and Edward L. Beckman (National Naval Medical Center, Naval Medical Research Institute, Bethesda, Md.).

Aerospace Medicine, vol. 36, Mar. 1965, p. 233-245. 11 refs.

Experimental evaluation of Gray's concept for the prevention of the deleterious effects of high accelerative forces upon animals by immersing them in water in a "constant volume" G-capsule. Primates were subjected to accelerations of up to +31G_z (positive headward acceleration) in such a system. The pathological and physiological findings of these experiments are said to demonstrate that mediastinal emphysema and air embolism were produced in all animals by overpressurization of the lungs in the constant volume G-capsule, either during the acceleration period, or by pressurization of the lungs prior to centrifugation, or by both mechanisms. In addition, circulatory failure occurred at the higher magnitudes of acceleration.

(Author) F. R. L.

A65-19845

EFFECTS OF GUST-INDUCED AND MANEUVERING ACCELERATION STRESS ON PILOT-VEHICLE PERFORMANCE.

Thomas E. Wempe (NASA, Ames Research Center, Biotechnology Div., Moffett Field, Calif.).

Aerospace Medicine, vol. 36, Mar. 1965, p. 246-255. 6 refs.

Assessment by a simulator study of the effects of gust-induced and maneuvering acceleration stress on pilot-vehicle performance during extended periods of low-level, high-speed flight. NASA test pilots were subjected to this acceleration stress on the Ames height control simulator, a device capable of realistically reproducing the vertical acceleration environment of this flight mode. The primary piloting task consisted of "flying" as close as possible to a 250-ft clearance height above the terrain without ground contact by use of conventional aircraft controls, while viewing aircraft instruments and a display depicting the terrain configuration ahead and below. Controlled variables were aircraft velocity, cockpit motion, gust intensity, additional secondary tasks, the presence of a bending mode vibration near the visceral resonance frequency, and the requirement for monitoring an automatic terrain-following system.

(Author) F. R. L.

A65-19846

NUTRITIONAL ACCEPTABILITY OF A DEHYDRATED DIET.
E. W. Speckmann, K. J. Smith, J. E. Vanderveen (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio), G. M. Homer, and D. Wiltsie Dunco (Miami Valley Hospital, Research Dept., Dayton, Ohio).
(Aerospace Medical Association, Annual Meeting, 35th, Miami Beach, Fla., May 11-14, 1964.)
Aerospace Medicine, vol. 36, Mar. 1965, p. 256-260. 27 refs. NASA-supported research.

Results of an experimental four-meals-per-day nutritionally balanced menu consisting of precooked, dehydrated, and bite-size compressed foods. A control menu composed of frozen, fresh, and heat-processed foods was prepared to match the experimental diet. The control and experimental diets were prepared and/or reconstituted with room temperature water, and both diets were served at room temperature to four healthy college students for 20 days while they were confined to an experimental metabolic facility. It is stated that no difference in the organoleptic quality of the experimental and control diets could be ascertained in this study. No evidence of monotony was revealed in either diet during the 20-day feeding trial. Both diets were highly digestible when fed to human volunteers. Subjects fed the control or experimental diet were maintained in nitrogen and energy balance. The subjects did not notice an increased gas production on either the control or experimental diet, nor did they encounter gastrointestinal stress at any time.

(Author) F.R.L.

A65-20020 #

ABSORPTION OF D-GLUCOSE BY SEGMENTS OF INTESTINE FROM ACTIVE AND HIBERNATING, IRRADIATED AND NON-IRRADIATED GROUND SQUIRRELS, CITELLUS TRIDECIMLINEATUS.

X. J. Musacchia and D. D. Westhoff (St. Louis University, Dept. of Biology, St. Louis, Mo.).
Academia Scientiarum Fennica, Annales, Series A IV - Biologica, no. 71/25, 1964, p. 348-358; Discussion, p. 358, 359. 18 refs. Grant No. NSG 271-62.

Discussion of experiments designed to compare intestinal absorption of D-glucose in active and hibernating animals. Active transport of D-glucose in vitro was found in intestinal segments of the ground squirrel. Segments of the duodenum, the jejunum, and the ileum of ground squirrels were used, and active transport occurred in each. It was found that segments from squirrels in the hibernating state had increased levels of active absorption of glucose. Segments taken from squirrels which had been given whole-body X-irradiation (2000 R), although not uniform in all three areas, also showed increased levels of absorption and transport.

(Author) F.R.L.

A65-20083 #

OPTICAL PROPERTIES OF CERTAIN SPECIES OF PLANTS IN THE INFRARED REGION OF THE SPECTRUM IN PASSING BEAMS [OPTICHESKIE SVOISTVA NEKOTORYKH VIDOV RASTENII V INFRAKRASNOI OBLASTI SPEKTRA V PROKHODIASHCHIKH LUCHAKH].

M. P. Perevertun.

IN: OBSERVATIONS OF THE MOON, MARS, URANUS, AND THE STARS - OPTICAL PROPERTIES OF PLANTS [NABLIUDENIIA LUNY, MARSA, URANA I ZVEZD - OPTICHESKIE SVOISTVA RASTENII]. (AKADEMIIA NAUK KAZAKHSKOI SSR, SEKTOR ASTROBOTANIKI, TRUDY. VOLUME 8.)
Edited by G. A. Tikhov.
Alma-Ata, Izdatel'stvo Akademii Nauk Kazakhskoi SSR, 1960, p. 59-64. In Russian.

Investigation of the optical properties of young leaves of various species of plants in the infrared region of the spectrum. Curves are obtained for the spectral coefficients of transmission of solar radiation by leaves and flower petals of the plants studied. Analysis of these curves is said to have shown the presence of carotenoids in all young, early-spring leaves, regardless of their color. A green maximum is said to be very pronounced in all the plants both with respect to amplitude and effective wavelength. Special note is taken of the fact that in the case of all the species studied the principal absorption band of chlorophyll in the red

portion of the spectrum lies exactly on the 0.680- μ wavelength, while the width and depth of the minimum of this band vary from plant to plant. The use of Dentley and Würmser nomograms to determine the absorption and the scattering coefficient is described. A wide transmission band of infrared radiation is observed in the plants studied in passing beams. The effective wavelength of this maximum transmission lies between 1.1 and 1.5 μ , varying slightly depending on the species of plant. The low degree of selectivity of the absorption of the plants in this region of the spectrum is attributed largely to the effect of geometrical optics.

A. B. K.

A65-20084 #

PECULIARITIES OF THE OPTICAL PROPERTIES OF HIGH-ALTITUDE PLANTS OF THE EASTERN PAMIR [OSOBENNOSTI OPTICHESKIKH SVOISTV VYSOKOGORNYKH RASTENII VOSTOCHNOGO PAMIRA].

A. P. Kutyreva, B. B. Intykbaeva, and Zh. Khatova.

IN: OBSERVATIONS OF THE MOON, MARS, URANUS, AND THE STARS - OPTICAL PROPERTIES OF PLANTS [NABLIUDENIIA LUNY, MARSA, URANA I ZVEZD - OPTICHESKIE SVOISTVA RASTENII].

(AKADEMIIA NAUK KAZAKHSKOI SSR, SEKTOR ASTROBOTANIKI, TRUDY. VOLUME 8.)

Edited by G. A. Tikhov.

Alma-Ata, Izdatel'stvo Akademii Nauk Kazakhskoi SSR, 1960, p. 65-103. 96 refs. In Russian.

Presentation of the results of investigations of the spectral peculiarities of the optical properties of a number of species of plants on the high-altitude semidesert of the Eastern Pamir. A climatological description is given of the region investigated. The instruments, observational procedure, and method of processing the data obtained from field spectral photography of the plants are described. A brief historical outline of the development and formation of the vegetation of the Eastern Pamir is given. The spectral characteristics of the optical properties of these plants are investigated in the subalpine, alpine, and level belts of the Eastern Pamir. The results of the investigations are analyzed and illustrated by tables and graphs. Among other things, it is concluded that the greatest changes with respect to magnitude and qualitative indices are noted in the region of the infrared and yellow-green maxima of reflection and transmission of light through a leaf and in the width and depth of the principal absorption band of chlorophyll.

A. B. K.

A65-20240

THE GEMINI FLIGHT.

American Medical Association, Journal, vol. 191, Mar. 22, 1965, p. 31-35.

Description of the medical program for the Gemini flight for the preparation of astronauts for extravehicular activity in orbit. The following subjects are considered: (1) problems of space travel, (2) germicidal packets, (3) the crew, and (4) physician monitors. It is stated that the biggest problem is still thought to be weightlessness. Another is accurate physiological monitoring for safety, in this instance, preparing the astronauts for activity outside their spacecraft and for longer and longer periods of space travel.

M. M.

A65-20495 #

MECHANOELECTRICAL AND BIOMECHANICAL PRINCIPLES OF CONTROL OF THE HUMAN UPPER LIMB MUSCLES.

A. Morecki (Warsaw, Polytechnic Institute, Chair of the Theory of Machines and Mechanisms, Warsaw, Poland), J. Ekiel (Warsaw, Polytechnic Institute, Chair of Electromedical Apparatuses Construction, Warsaw, Poland), and K. Fidelus (Academy of Physical Culture, Warsaw, Poland).

Archiwum Budowy Maszyn, vol. 11, no. 4, 1964, p. 727-754. 20 refs.

Discussion of the structural scheme of the human arm and of individual systems with 2 to 17 degrees of freedom examined in the tests. A tensometric stand constructed to study the relation between the stimulating parameters and position, velocity, and force is described.

V. P.

A65-20933

BIOLOGICAL ACTION OF ULTRASOUND AND UHF ELECTROMAGNETIC OSCILLATIONS [BIOLOGICHESKOE DEISTVIE UL'TRAZVUKA I SVERKHYVYSOKOCHASTOTNYKH ELEKTROMAGNITNYKH KOLEBANI].

Edited by A. A. Gorodetskii (Akademiia Nauk Ukrainesoi SSR, Kiev, Ukrainian SSR).

Kiev, Naukova Dumka, 1964. 119 p. In Russian.

CONTENTS:

HEATING EFFECT OF A MICROWAVE ELECTROMAGNETIC FIELD ON ANIMALS AND CERTAIN PROBLEMS IN THE DOSIMETRY OF A MICROWAVE FIELD [TEPLOVOI EFFEKT DEISTVIA SVCH ELEKTROMAGNITNOGO POLIA NA ZHIVOTNYKH I NEKOTORYE VOPROSY DOZIMETRII SVCH POLIA]. V. I. Mirutenko, p. 62-79. 60 refs. [See A65-20934 10-04]

THE EFFECT OF A MICROWAVE ELECTROMAGNETIC FIELD ON BREEDING, PERIPHERAL-BLOOD COMPOSITION, CONDITIONED-REFLEX ACTIVITY, AND THE MORPHOLOGY OF INTERNAL ORGANS OF WHITE MICE [VLIANIE SVCH ELEKTROMAGNITNOGO POLIA NA RAZMNOZHENIE, SOSTAV PERIFERICHESKOI KROVI, USLOVNOREFLEKTORNUII DEIATEL'NOST' I MORFOLOGIU VNUTRENNIKH ORGANOV BELYKH MYSHEI].

S. F. Gorodetskaya, p. 80-91. 8 refs. [See A65-20935 10-04]

THE PROBLEM OF MICROWAVE SKIN LESIONS [K VOPROSU O MIKROVOLNOVYKH PORAZHENIIAKH KOZHI]. A. A. Slabospitskii, p. 92-107. 28 refs. [See A65-20936 10-04]

THE EFFECT OF A MICROWAVE ELECTROMAGNETIC FIELD ON THE ACTIVITY OF POLYNUCLEASES AND THE CONTENT OF NUCLEIC ACIDS [VLIANIE SVCH ELEKTROMAGNITNOGO POLIA NA AKTIVNOST' POLINUKLEAZ I SODERZHANIE NUKLEINOVYKH KISLOT]. N. I. Kerova, p. 108-118. 11 refs. [See A65-20937 10-04]

A65-20934 #

HEATING EFFECT OF A MICROWAVE ELECTROMAGNETIC FIELD ON ANIMALS AND CERTAIN PROBLEMS IN THE DOSIMETRY OF A MICROWAVE FIELD [TEPLOVOI EFFEKT DEISTVIA SVCH ELEKTROMAGNITNOGO POLIA NA ZHIVOTNYKH I NEKOTORYE VOPROSY DOZIMETRII SVCH POLIA].

V. I. Mirutenko.

IN: BIOLOGICAL EFFECT OF ULTRASOUND AND UHF ELECTROMAGNETIC OSCILLATIONS [BIOLOGICHESKOE DEISTVIE UL'TRAZVUKA I SVERKHYVYSOKOCHASTOTNYKH ELEKTROMAGNITNYKH KOLEBANI].

Edited by A. A. Gorodetskii.

Kiev, Naukova Dumka, 1964, p. 62-79. 60 refs. In Russian.

Investigation of the biological effect of microwave irradiation on animals with a discussion of problems connected with the dosimetry of a microwave field. A method of waveguide dosimetry is developed to measure the absorbed energy of a microwave field of the 3-cm range in a biological object. With the aid of this method the threshold values of the nonthermal intensities of a microwave field are determined, and the heating patterns of tissues and organs of a living organism during local and overall irradiation are ascertained. By investigations of models and cadavers, the role of blood circulation in the distribution of heat to the organs and tissues of an animal during its irradiation in a 3-cm wavelength microwave field is ascertained.

A. B. K.

A65-20935 #

THE EFFECT OF A MICROWAVE ELECTROMAGNETIC FIELD ON BREEDING, PERIPHERAL-BLOOD COMPOSITION, CONDITIONED-REFLEX ACTIVITY, AND THE MORPHOLOGY OF INTERNAL ORGANS OF WHITE MICE [VLIANIE SVCH ELEKTROMAGNITNOGO POLIA NA RAZMNOZHENIE, SOSTAV PERIFERICHESKOI KROVI, USLOVNOREFLEKTORNUII DEIATEL'NOST' I MORFOLOGIU VNUTRENNIKH ORGANOV BELYKH MYSHEI].

S. F. Gorodetskaya.

IN: BIOLOGICAL EFFECT OF ULTRASOUND AND UHF ELECTROMAGNETIC OSCILLATIONS [BIOLOGICHESKOE DEISTVIE UL'TRAZVUKA I SVERKHYVYSOKOCHASTOTNYKH ELEKTROMAGNITNYKH KOLEBANI].

Edited by A. A. Gorodetskii.

Kiev, Naukova Dumka, 1964, p. 80-91. 8 refs. In Russian.

Study of the effects of microwave irradiation on the organisms of white mice. The methods of investigating the various functions involved in this study are described. A detailed investigation is made of the breeding activity of white mice. Irradiation of male white mice in a microwave field is found to cause a temporary decrease in their fertility and, in general, a partial disturbance of spermatogenesis in their seminal ducts. Microwave irradiation is found to have more serious effects on female white mice than on males, the most heavily damaged parts of the sexual organs of the females being the ovarian follicles. The effects of microwave irradiation on the peripheral-blood composition and the hematogenic organs of white mice and on their conditioned-reflex activity are also studied.

A. B. K.

A65-20936 #

THE PROBLEM OF MICROWAVE SKIN LESIONS [K VOPROSU O MIKROVOLNOVYKH PORAZHENIIAKH KOZHI].

A. A. Slabospitskii.

IN: BIOLOGICAL EFFECT OF ULTRASOUND AND UHF ELECTROMAGNETIC OSCILLATIONS [BIOLOGICHESKOE DEISTVIE UL'TRAZVUKA I SVERKHYVYSOKOCHASTOTNYKH ELEKTROMAGNITNYKH KOLEBANI].

Edited by A. A. Gorodetskii.

Kiev, Naukova Dumka, 1964, p. 92-107. 28 refs. In Russian.

Study of skin lesions caused by 3-cm microwaves during local irradiation of white rats and rabbits. Two series of tests were made, a main series and a control series. During direct irradiation of the skin by microwaves for 3 min a primary pathological focus characterized by disinnervation and a stable stasis on the affected part is noted. Further changes in the primary pathological focus are characterized by necrobiotic processes resulting in mummification. The action of microwaves of the same intensity, but under conditions where heating of the irradiated part of the animal's skin is prevented, does not cause pathological changes.

A. B. K.

A65-20937 #

THE EFFECT OF A MICROWAVE ELECTROMAGNETIC FIELD ON THE ACTIVITY OF POLYNUCLEASES AND THE CONTENT OF NUCLEIC ACIDS [VLIANIE SVCH ELEKTROMAGNITNOGO POLIA NA AKTIVNOST' POLINUKLEAZ I SODERZHANIE NUKLEINOVYKH KISLOT].

N. I. Kerova.

IN: BIOLOGICAL EFFECT OF ULTRASOUND AND UHF ELECTROMAGNETIC OSCILLATIONS [BIOLOGICHESKOE DEISTVIE UL'TRAZVUKA I SVERKHYVYSOKOCHASTOTNYKH ELEKTROMAGNITNYKH KOLEBANI].

Edited by A. A. Gorodetskii.

Kiev, Naukova Dumka, 1964, p. 108-118. 11 refs. In Russian.

Investigation of the changes occurring in the nucleic-acid metabolism of white rats after irradiation by 3-cm radio waves. Irradiation for 6 min in doses of 0.5 and 0.1 w/cm² ultimately results in various degrees of inactivation of ribonuclease and desoxyribonuclease, an increase in the content of ribonucleic acid, and a decrease in the content of desoxyribonucleic acid, although immediately after irradiation with a dose of 0.1 w/cm² activation of ribonuclease and desoxyribonuclease is noted in the skin. The latter phenomenon is attributed to the stimulating action of radio waves at this dose and for the period of irradiation in question.

A. B. K.

A65-20953 #

VECTOR RETICLE, CONTROL ACTION DISPLAY IN MANUAL CONTROL OF SPACE VEHICLE ATTITUDE.

Robert H. Cannon, Jr. (Stanford University, Stanford, Calif.) and Walter G. Eppler, Jr. (Lockheed Aircraft Corp., Lockheed Missiles and Space Co., Electronics Sciences Laboratory, Palo Alto, Calif.).

Journal of Spacecraft and Rockets, vol. 2, Mar.-Apr. 1965, p. 172-182. 14 refs.

Grant No. NSG 133-61.

Suggestion of two concepts, the vector reticle and control action display, as effective means for making manual three-axis attitude control quicker and more efficient while substantially

reducing the concentration required of the pilot. A system design is submitted in which the two concepts are combined in a control action reticle, and in which the pilot has direct control of the jet valves. (The entire system may be mechanical.) The system is controlled to a visual reference or to an instrument attitude reference. Malfunction of the system cannot interfere with normal manual control. The vector reticle presents all auxiliary information in a single three-part geometric vector superimposed on the window (rather than on three separate dials, for example), thus reducing the number of quantities to be monitored from three to one. Control action display gives the pilot instantaneous and exclusive control of the reticle, thus removing the need for two mental integrations and greatly reducing the concentration required for tracking. Results are presented of three-axis (fixed-base) simulation studies of the proposed system and of other systems for comparison. (Author) M. M.

E. Busnengo and G. Meineri (Ispettorato di Sanità Aeronautica; Centro di Studi e Ricerche di Medicina Aeronautica e Spaziale, Rome, Italy). Rivista di Medicina Aeronautica e Spaziale, vol. 27, Oct. -Dec. 1964, p. 498-504. In Italian.

Investigation of EKG behavior in 148 candidate flying cadets under both standard conditions at sea level and in acute anoxic anoxia at a simulated altitude of 5500 m, with special reference to right intraventricular conduction. The purpose was to deduce from the EKG behavior in hypoxic conditions possible elements of clinical and diagnostic significance for evaluating the subjects. A disturbance of right intraventricular conduction was found in 28.4% of the subjects under standard conditions and in an additional 12.2% during the hypoxia test. It is concluded that, under the experimental conditions, there is a need for more intensive analysis of cardiocirculatory behavior in subjects affected by minor disturbances of right intraventricular conduction. (Author) M. M.

A65-20984

THE RATIO BETWEEN OXYGEN INTAKE AND HEART RATE IN THE EVALUATION OF THE CARDIOVASCULAR FUNCTION [IL RAPPORTO FRA CONSUMO DI OSSIGENO E FREQUENZA CARDIACA NELLA VALUTAZIONE FUNZIONALE CARDIO-CIRCULATORIA].

G. Janigro (Ispettorato di Sanità Aeronautica; Centro di Studi e Ricerche di Medicina Aeronautica e Spaziale, Rome, Italy). Rivista di Medicina Aeronautica e Spaziale, vol. 27, Oct. -Dec. 1964, p. 447-466. 9 refs. In Italian.

Study of the values of the ratio between oxygen consumption and heart rate during maximum muscular exercise in 480 young, healthy candidate flying cadets with no specific physical training. It is stated that, in different groups classified according to the amount of exercise performed, there was evidence of very close correlation between this ratio and the parameters considered as reliable indices of respiratory and cardiac functions, such as maximum breathing capacity, maximum oxygen consumption, and Margaria's ratio of calories to pulmonary ventilation. The study stresses possible advantages of using this ratio for the continuous evaluation of the training levels of athletes in sports competition or for an objective evaluation of respiratory and cardiovascular functions in selecting subjects for activities requiring great physical efficiency. (Author) M. M.

A65-20985

HISTOLOGICAL CHANGES IN SOME ORGANS OF MICE TWICE IRRADIATED WITH Co^{60} AND GRAFTED WITH HOMOLOGOUS BONE MARROW [SULLE MODIFICHE ISTOLOGICHE CHE SI VERIFICANO IN ALCUNI ORGANI DI TOPI PER DUE VOLTE IRRADIATI CON Co^{60} E TRAPIANTATI CON MIDOLLO OSSEO OMOLOGO].

G. Mazzella and G. Paolucci (Ispettorato di Sanità Aeronautica; Centro di Studi e Ricerche di Medicina Aeronautica e Spaziale, Rome, Italy).

Rivista di Medicina Aeronautica e Spaziale, vol. 27, Oct. -Dec. 1964, p. 467-485. 14 refs. In Italian.

General histological study of preparations from mice, irradiated in open air or in anoxia, and then grafted with homologous bone marrow. The mice were divided into five groups and the treatment was repeated in some of them. The mice died spontaneously at different times. The organs examined were liver, spleen, and bone marrow. Changes were reported in groups irradiated and grafted one and two times as compared with those groups which were irradiated only. These changes were studied in microphotographs, 16 of which are reproduced. The investigation stresses belated results, namely, those not obtained until approximately one year after irradiation. Notable histological changes were observed in irradiated and grafted animals, whereas only slight changes were observed in animals grafted, once or several times, in open air or in anoxia. (Author) M. M.

A65-20986

BEHAVIOR OF RIGHT INTRAVENTRICULAR CONDUCTION IN MAN IN ACUTE ANOXIC ANOXIA [COMPORTAMENTO DELLA CONDUZIONE INTRAVENTRICOLARE DESTRA NELL'UOMO IN ANOSSIA ANOSSICA ACUTA].

LC ENTRIES

A65-80733

PROTECTION AGAINST EPILATION BY CYSTEAMINE AFTER LOCAL IRRADIATION IN RAT [PROTECTION CONTRE L'EPILATION PAR LA CYSTAMINE APRES IRRADIATION LOCALE CHEZ LE RAT]. P. van Caneghem (Liège U., Lab. de Pathol. et Thérap. Gén., de Rech. pour la Protect. des Populations Civiles, Belgium). *Experientia*, vol. 20, 1964, p. 699-700. 10 refs. In French.

Fifty rats were locally irradiated in six different areas with 600 and 1000 roentgens. One irradiation was made immediately before the intraperitoneal injection of 146 mg/kg of cystamine. The five other areas were irradiated respectively 5, 10, 25, 45, and 60 minutes after cystamine injection. Maximum protection against depilation with cystamine was observed 10 minutes after irradiation and persisted appreciably after 60 minutes.

A65-80734

ON THE RELATIONSHIP BETWEEN TACTILE PERCEPTION THRESHOLD AND POTENTIALS EVOKED IN THE SOMATO-SENSITIVE CEREBRAL CORTEX [SUR LA RELATION ENTRE LE SEUIL DE PERCEPTION TACTILE ET LES POTENTIELS EVOQUES DE L'ECORCE CEREBRALE SOMATO-SENSIBLE CHEZ L'HOMME].

Julien Debecker, Jean Edouard Desmedt, and Jacqueline Manil (Brussels U., Lab. de Pathol. Gén. du Système Nerveux, Belgium). *Comptes Rendus de l'Académie des Sciences*, vol. 260, Jan. 11, 1965, p. 687-689. 10 refs.

The cerebral potentials evoked by application of juxtalimmary electrical shocks on a finger of the hand in normal conscious man were analyzed using a numerical ordinator mnemotron. Simultaneously determined was the psychometric curve indicating the percentage detection of these stimulations by the subject. Under optimal technical conditions, a potential evoked primarily in the area of the scalp demonstrated that the stimulus was perceived by the subject only in 10% to 50% of the tests. The statistical psychological threshold may possibly be related to cerebral electrical sign.

A65-80735

SIZE-CONSTANCY AS DEPENDENT UPON ANGLE OF REGARD AND SPATIAL DIRECTION OF THE STIMULUS-OBJECT.

J. P. Van de Geer and E. J. Zwaan (Inst. for Perception RVO/TNO, Soesterberg, The Netherlands).

American Journal of Psychology, vol. 77, Dec. 1964, p. 563-575. 6 refs.

Three experiments were set up to assess the influence of both the angle of regard and the spatial direction of a stimulus-object upon the size-constancy ratio at distances up to 40 m. It was shown that both factors have an effect in the sense that normal, straight forward, regard and horizontal direction yield a higher size-constancy ratio than, elevated regard and vertical direction respectively. Prolonged monocular viewing conditions decrease the effect of the angle of regard. The suggestion is made that the use of size and distance cues is learned mainly in situations where the observer looks straight ahead at objects in a horizontal plane and that this learning is generalized to situations of the same sort. When that observer is looking at an extreme angle of regard, or finds himself viewing in an unusual spatial direction, he makes less optimal use of the cues available.

A65-80736

EFFECTS OF SYMMETRY ON THE PERCEPTION OF TACHISTOSCOPIC PATTERNS.

E. Rae Harcum (Coll. of William and Mary, Williamsburg, Va.)

American Journal of Psychology, vol. 77, Dec. 1964, p. 600-606. 12 refs. Grant PHS NB 02661-03.

The basic assumption of this study was that perception of letter patterns flashed across the visual field requires a temporal as well as a spatial analysis of the visual traces. Therefore, patterns composed of asymmetrical letters, which have greater intrinsic directional capacity than symmetrical letters, should be more consistently analyzed in one direction. Primacy effects favoring the elements analyzed first would produce, it was predicted, a larger differential in errors of reproduction between hemifields for asymmetrical-letter patterns. It was also predicted that conflicts between directional-scanning tendencies would produce a greater overall number of errors for the symmetrical patterns. In two experiments both predicted outcomes were obtained.

A65-80737

FIGURAL AFTER-EFFECTS: DISPLACEMENT OR CONTRAST?

Robert B. Freeman, Jr. (Pa. State U., University Park).

American Journal of Psychology, vol. 77, Dec. 1964, p. 607-613. 10 refs.

An experiment was conducted to measure variation in figural aftereffects (FAE) as a function of the eight ratios of the size of the I- to the T-figure. In

addition, size of the I-figure (in retinal angle) was varied over three values; the I-figure was presented at five values of eccentricity in relation to the T-figure and in two different directions (up and down). The results of the experiment support the hypothesis that the major determinant of the size-effect is successive size-contrast, in which the critical stimulus variable is the ratio of the size of the I- and T-figures. The typical inflection of the FAE (distance paradox) was obtained for various conditions of eccentricity. Variation in the absolute size of the I-figure did not affect the shape or slope of the FAE function. FAE's were, however, obtained only when the I-figure was either at the same level as or lower than the T-figure in an otherwise impoverished visual field.

A65-80738

VIGILANCE, AGE, AND RESPONSE-TIME.

Walter W. Surwillo and Reginald E. Quilter (Baltimore City Hosp., Gerontol. Branch, Md.)

American Journal of Psychology, vol. 77, Dec. 1964, p. 614-620. 11 refs.

Current research on the topic of attention has concerned itself largely with the matter of subjects readiness to react to a stimulus. This readiness has been named "vigilance," and is defined in terms of the efficiency with which small but perceivable changes in the external environment are detected. The present experiment studied the relation of vigilance to age and investigated the question of whether differences in vigilance could account for the frequently reported finding that old people are slower responders than young persons. Fifty-three young (M=43.7 yr.) and 53 old subjects (M=71.0 yr.), were tested for a period of 1 hr. on Mackworth's Clock Test. It was found that the old subjects were as vigilant as the young in the initial stages of watchkeeping but, after 45 min. on the task, vigilance declined to a significantly lower level in the older group. Reaction time and vigilance were significantly correlated, but age-differences in the latter variable were apparently not associated with corresponding differences in speed of response.

A65-80739

THE EFFECT OF BURSTS OF NOISE ON AN ARITHMETIC TASK.

Muriel M. Woodhead (British Med. Res. Council, Applied Psychol. Res. Unit, Cambridge, Great Britain).

American Journal of Psychology, vol. 77, Dec. 1964, p. 627-633. 10 refs.

Bursts of 100 dB noise were found to affect performance in arithmetic. In each of 40 problems the subjects were required to memorize a 6-digit number from a visual display and then to subtract from it a visible 4-digit number. In comparison with quiet conditions, the occurrence of a brief noise while the numbers were being learned produced a tendency to get the subsequent calculation wrong. When the noise occurred during the calculating period, the rate of work increased throughout the session from a rather slow start. Thus the effects of a burst of noise depend upon its relationship with different parts of the task. An occurrence during perception and learning does not have the same effect as one during calculation.

A65-80740

A DELAYED FEEDBACK SELF-TRACKING AND RECORDING INSTRUMENT B. J. Baldridge (Cincinnati U., Ohio).

American Journal of Psychology, vol. 77, Dec. 1964, p. 638-642.

An instrument designed to be a simple, yet refined, delayed feedback self-tracking device to provide information about natural or preferred tracking characteristics of the human subject is presented. This instrument is a specially designed combined tracking and recording device. Its purpose is to provide a single dimensional tracking-task, with the initial target (the pattern to be followed) provided by the experimenter, and with arrangements for the subject's response to be fed back in such a way that he would subsequently track his own sequence of responses. The initial target can be any arbitrary function with a fundamental period of 8 sec. Feeding back the subject's response, in effect, serves to modify the initial pattern by the amount of the tracking error. This may be stated clearly in the following equation: initial target + error = response = new target.

A65-80741

AET AS A RADIOPROTECTIVE AGENT AT THE CELLULAR LEVEL.

Roberts Rugh and Karen Fu (Columbia U., Coll. of Phys. and Surg., Dept. of Radiol., Radiol. Res. Lab., New York, N. Y.)

Biological Bulletin, vol. 128, Feb. 1965, p. 125-132. 36 refs.

Contract AT-(30-1)-2740; Grant PHS RH-81.

Arbacia eggs exposed to 50 000 R gamma rays showed a delay in the initiation of the first cleavage with ultimate cleavage reaching only 11% and abnormalities reaching 18%. Not a single egg so exposed ever reached the pluteus stage. The delay in the initiation of the first cleavage was also reduced by a delay in fertilization, and the percentage of ultimate cleavage was improved. The optimum conditions provided were: exposure to 3 mg% AET (S,2-aminoethylisothiourea-Di-HBr) in sea water for 10 minutes prior to and 10 minutes during gamma irradiation to 50 000 R, and yet this allowed no improvement in cleavage time, degree of membrane elevation, or development. Not a single egg thus treated reached either the pluteus or gastrula stages. It is concluded that while AET has proven to be radioprotective for the adult mammal, this protection (survival) may not be effected through individual cells but through tissue or organ regeneration. However, extrapolation is

always hazardous and AET may be cell- or species-specific. The haploid *Arbacia* cell (cytoplasm and nucleus) is not subject to any protective action from AET.

A65-80742

PERSONALITY STRUCTURE, GROUP COMPOSITION, AND GROUP FUNCTIONING.

Bruce W. Tuckman (Naval Med. Res. Inst., Bethesda, Md.)
Sociometry, vol. 27, Dec. 1964, p. 469-487.

Three man groups, homogeneous in personality structure, participated in a stock market simulation over 10 sessions. It was hypothesized that more abstract individuals (i.e., individuals who perceive a more multifaceted world and who think in terms of alternative interpretations and approaches) would adopt a group structure which was more flexible and open than homogeneous groups of concrete individuals. It was further hypothesized that the abstract group would display more environmental sensitivity, a more informational orientation, greater differentiation, and a more integrated strategy in dealing with the task than would concrete groups. Both hypotheses were confirmed by the data, indicating that a knowledge of the personalities of group members enables one to predict consequent behaviors of the group.

A65-80743

THE ACOUSTICAL IMPEDANCE OF HUMAN EARS AND A NEW ARTIFICIAL EAR.

A. H. Ithell, E. G. T. Johnson, and R. F. Yates (Post Office Res. Sta., London, England).

Acustica, vol. 15, 1965, p. 109-116. 12 refs.

Measurements have been made on adult males with normal hearing, using a combination of two techniques on three separate samples. Results have been obtained which are consistent both within themselves and in comparison with work by others. Based upon the information obtained, a new artificial ear has been designed offering substantially the same acoustical input impedance as the average real ear in the frequency range 20 cps to 4000 cps and possessing mechanical advantages over other types of artificial ears. The mechanism causing the apparent change of volume of real ears, at a frequency of a few hundred cycles per second, is thought to be due to a mechanical resonance of the outer ear. It has been shown, however, that the equivalent volume of the middle ear is considerably greater than was at first thought, due to the porous nature of the bone structure, and the possibility cannot be ruled out that a coupling exists to this porous volume through the walls of the external meatus.

A65-80744

SANITARY EVACUATION DURING AIRPLANE FLIGHT (LES EVACUATIONS SANITAIRES PAR VOIE AERIENNE). Desplats.

Forces Aériennes Françaises, vol. 19, Feb. 1965, p. 191-210. In French.

The evolution of French aeromedical evacuation techniques from 1919 at Morocco to the wars in Indochina, Korea, and Algeria are reviewed. Included in the therapeutic chain is the pickup of wounded, rehabilitation, evacuation, and surgery. These take place in three stages: (1) transportation of wounded by helicopter or light aircraft to surgical units; (2) evacuation of patients from surgical units to hospital; and (3) transportation of wounded to special treatment centers or toward convalescent centers. Aeromedical evacuation poses problems which depend, both in war and peace times, on the tactical, logistic, and medical needs. Aeromedical evacuation necessitates administrative preparation for proper functioning. It appeared imperative that a specialized unit for this purpose be designated called the Transit Center for Aeromedical Evacuation. The center consists of a miniature hospital at the airport sufficiently away from the combat zone, easily accessible by air or land, and protected against nuclear attack. The role and personnel of the center are discussed along with the current doctrine of aeromedical evacuation, and the possibilities offered for air transport of wounded in civilian aviation.

A65-80745

THE EFFECT OF UNDERWATER SWIMMING ON THE LEVEL OF RESPIRATORY TRANSFORMATION [POZIOM PRZEMIANY ODDECHOWEJ PO PLYWANIU POD WODA W WARUNKACH BEZDECHU I PRZY ODDYCHANIU TLENIEM].

I. Wojcieszak.

Wychowanie Fizyczne i Sport, vol. 8, 1964, p. 413-426. 17 refs. In Polish.

The energy cost of underwater swimming during breath holding and data concerning the adaptation of the organism were determined. The tests were made on 7 subjects (20 to 23 yr) and included determination of alveolar gas exchange. The tests were carried out at rest and during a 10 min rest period after swimming 25 and 50 meters without breathing and with oxygen. Directly after the 50 meter swim without breathing, ventilation was 62 l/min, oxygen consumption 2902 ml/min, and carbon dioxide output 3120 ml/min. Lower values were found after swimming with breathing. The rest period was marked by a decrease in ventilation, oxygen consumption and carbon dioxide output, while there was an increase in the respiratory quotient. Lactic acid level in the blood after swimming without breathing was 60.4 [mg%]. The results indicate that the subjects performed by anaerobic work, and

that the capacity to perform work without breathing may indicate an adaptation to work under conditions of oxygen shortage and increasing acidification.

A65-80746

BIOLOGICAL RHYTHMS AND CYCLES IN ANIMAL ORGANISMS [RYTHMES ET CYCLES BIOLOGIQUES CHEZ LES ORGANISMES ANIMAUX].

H. Simonnet (Ecole Nat. Vétérinaire, Alfort, France).

Biologie Médicale, vol. 53, May-Jun. 1964, p. 266-267. In French.

A bibliography is given of 11 published papers which review the problem of biological cycles and rhythms in the animal kingdom. Included are the following authors: J. Aschoff (1959), F. Halberg (1953, 1959), J. E. Harber (1958), A. Jores (1935, 1937), H. Kalmos (1938), N. Kleitman (1949), A. Reinberg and J. Ghata (1957), A. Sollberger (1961), and H. M. Webb and F. A. Brown (1959).

A65-80747

MICROWAVE EFFECT ON NERVE FUNCTIONAL STATE [DEISTVIE MIKROVOLN NA FUNKSIONAL'NOE SOSTOIANIE NERVA].

Iu. I. Kamenskii (Central Res. Inst. of Summer Resorts and Physiotherapy, Moscow, USSR).

Biofizika, vol. 9, 1964, p. 695-700. 21 refs. In Russian.

Exposure of a frog's nerve to a continuous microwave beam ($\lambda = 12.5$ cm; 11 mv/cm²) for 20 to 30 min increased the velocity of the impulse propagation, shortened the absolute and relative refractive phases, and changed the amplitude of the nerve potential, but did not affect the excitability threshold. Repeated stimulation for 1 μ sec by microwaves ($\lambda = 10$ cm; frequency = 700 imp/sec, 12 mv/cm²) during 20 to 30 minutes increased the impulse velocity and elevated nerve sensitivity. While the continuous exposure effect may be considered to be thermal, repeated stimulation produced a specific effect.

A65-80748

RETINA POTENTIAL (EERG) INDUCED BY ELECTRIC CURRENT [VYZVAN- NYI ELEKTRICHESKIM TOKOM POTENTIAL SETCHATKI (EERG)].

A. I. Bogoslovskii, E. N. Semenovskaja, and V. K. Zhdanov.

Biofizika, vol. 9, 1964, p. 701-709. 21 refs. In Russian.

Electric stimulation of the human eyeball produced phosphenes and evoked potentials in the retina. The registered potentials showed increases in amplitude and duration, which were in logarithmic ratio to the increase of the stimulus intensity and coincided with the increase in phosphene luminosity. Individual visual adaptation determined the values. No retinal potentials were observed when the sensors were inserted into the hollow eye orbit. Electric stimulation of the nasal mucosa, ear lobe, or the skin of the hand did not produce the same type of potential tracings.

A65-80749

INVESTIGATION OF POSTURAL MECHANISM [ISSLEDOVANIE POZNOI AKTIVNOSTI].

I. M. Gel'fand, V. S. Gurfinkel, Ia. M. Kots, V. I. Krinskii, M. L. Tsetin, M. L. Shik (USSR, Acad. of Sci., Inst. of Biol. Phys., Moscow).

Biofizika, vol. 9, 1964, p. 710-717. 17 refs. In Russian.

Findings in the study of tremor in human subjects, during an effort to hold an assumed pose, gave reasons to propose existence of a special mechanism which allows asynchronized action of the motor units during a moderate effort to hold the steady pose. Individual motor unit impulses persisted for several seconds without shifting to other units. The essential part of this mechanism may be selective afferent activation of the muscle spindle by way of gamma-motor neurons.

A65-80750

CALCULATION OF PHYSIOLOGICAL TREMOR SPECTRUM BASED ON WORK OF MOTOR UNITS [VYCHISLENIE SPEKTRA FIZIOLOGICHESKOGO TREMORA NA OSNOVE DANNYKH O RABOTE DVIGATEL'NYKH EDINIT].

A. G. Fel'dman (USSR, Acad. of Sci., Inst. of Biol. Phys., Moscow).

Biofizika, vol. 9, 1964, p. 726-730. In Russian.

Quantitative studies of a single contraction of motor units and computation of spectral density of tremor led to the conclusion that the high-frequency component of the physiological tremor during the steady-pose hold is determined by the action of the motor units. This conclusion is in accordance with the accepted hypothesis.

A65-80751

CHANGES IN TREMOR SPECTRAL COMPOSITION DEPENDING ON CHARACTER OF MOTOR TASK [K VOPROSU OB IZMENENIIAKH SPECTRAL'NOGO SOSTAVA TREMORA V ZAVISIMOSTI OT KHARAKTERA DVIGATEL'NOI ZADACHI].

E. I. Pal'tsev (USSR, Acad. of Sci., Inst. of Biol. Phys., Moscow).

Biofizika, vol. 9, 1964, p. 742-745. 7 refs. In Russian.

Studies were conducted on human subjects, who were directed to perform two tasks: to hold an assumed relaxed pose and to keep a light beam on a fixed point from a hand-held light source during a steady-hold pose. The results showed that the frequency range of tremor of the steady-hold pose varied

with the individuals. The change from rest to actively maintaining a fixed point resulted in a frequency range change similar in all individuals. The maximal value in both tasks coincided, though values were different. The findings indicate that the tremor varies in character depending upon the type of task and is related to the general manner of movement control.

A65-80752

EFFECT OF AIR NITROGEN REPLACEMENT BY HELIUM ON CHICK EMBRYO DEVELOPMENT [ANALIZ VLIHANIA ZAMENY AZOTA VOZ-DYKHA GELIEM NA RAZVITIE KURINYKH EMBRIONOV]. B. M. Savin, V. V. Rol'nik, P. A. Gul'taev, and V. V. Boriskin (USSR, Acad. of Sci., I. M. Sechenova Inst. of Evolutionary Physiol.; and S. M. Kirova Mil. Med. Acad., Leningrad, USSR).

Biofizika, vol. 9, 1964, p. 589-596, 14 refs. In Russian.

Almost complete (99%) substitution of nitrogen of the ambient air by helium did not essentially interfere with the normal development of chick embryos. However, in the helium-oxygen atmosphere heat loss by the tissues was increased by 100% and water evaporation by 40%, as compared with normal atmospheric environment.

A65-80753

QUANTITATIVE RELATIONSHIP OF MOTOR UNITS WORK IN STATIONARY POSTURE [KOLICHESTVENNYE KHARAKTERISTIKI RABOTY DIVIGATEL'NYKH EDINIT V STATSIONARNOM REZHIME].

V. S. Gurfinkel, A. N. Ivanova, Ia. M. Kots, I. M. Piaterski-Shapiro, and M. K. Shik (USSR, Acad. of Sci., Inst. of Biol. Phys.; and Steklova Math. Inst., Moscow).

Biofizika, vol. 9, 1964, p. 636-638. In Russian.

In normal human subjects, who were requested to hold an assumed posture, the ratio of standard deviation to the average time interval between impulses was found to be constant and less than one. The findings suggest the existence of a mechanism for regulation of the stationary-pose motor units. It may be located in the segment area of the spinal cord. Training may establish an increase in the variability time interval between impulses. The uniformity of the simultaneous disturbance of the successive retardation in two different motor units, and the fact that the average retardation was equal to the average interval time between the two impulses of one motor unit, and that the value of the cross correlation between impulse time of two motor units was small for all points and did not diminish, indicated independent action of the two different motor units. It is very possible that the rhythm and small variability of the motor unit action could be achieved by the combined action of the spinal segment and the cerebral cortex whenever visual and auditory afferent pathways are involved.

A65-80754

GROWTH RATES OF PHOTOSYNTHETIC MICROORGANISMS IN LABORATORY CULTURES.

H. Hoogenhout and J. Ames (State U., Leiden, Biophys. Lab., The Netherlands).

Archiv für Mikrobiologie, vol. 50, 1965, p. 10-24. 65 refs.

Growth rates, measured under various conditions, are reported for *Anacystis nidulans*, *Schizothrix calcicola*, *Porphyridium aeruginum*, *Cyanidium caldarium*, *Navicula minima*, *Vischeria stellata*, *Ankistrodesmus braunii*, *Chlorella ellipsoidea*, and *Chlorella pyrenoidosa* in terms of the growth constant K during exponential growth. A description of the culturing and measuring techniques is given. The reliability of these techniques is discussed. A list of K values is presented, calculated from growth data given in the literature for various photosynthetic microorganisms (algae and bacteria).

A65-80755

BIOLOGIC EFFECTS OF HUMAN RADIATION EXPOSURE. REPORT OF A CRITICALITY ACCIDENT.

P. A. Fuqua, W. D. Norwood, and S. Marks (Hanford Atomic Products Operation, Occupational Med. Operation, Richland, Wash.)

Journal of Occupational Medicine, vol. 7, Mar. 1965, p. 85-93. 28 refs.

The results of extensive clinical and laboratory studies conducted over a period of 2 years on 3 employees exposed to radiation in a criticality accident are presented. The estimated whole-body doses ranged from 19 to 123 rems of mixed gamma and neutron radiation. Evidence of temporary radiation effects was obtained only in the gonads and hematopoietic system. The gonadal effects consisted of impaired spermatogenesis and increased gonadotrophin excretion. Hematologic effects included transitory bone marrow damage, a mild decline in the lymphocyte count in 1 case, and the production of morphologically aberrant blood cells. A significant increase in chromosome aberrations in the circulating leukocytes occurred. No ocular damage or increase in the urinary excretion of amino acids was observed.

A65-80756

THE EFFECT OF PYRIDOXINE AND PYRIDOXAL ON THE CIRCULATORY RESPONSE OF RATS TO MICROWAVE IRRADIATION.

T. Cooper, M. Jellinek, Teresa Pinakart, and A. W. Richardson (St. Louis U., Center for Cardiovascular Res., and Dept. of Physiol., Mo.)

Experientia, vol. 21, 1965, p. 28-29. 8 refs.

Grants PHS HE-06312, HE-06762, and HE-K3-5616.

Rats were first treated with either injections of pyridoxine or pyridoxal and then exposed for 10 min to microwave radiation (2450 Mc continuous wave, 0.08 W/cm²). In the untreated animals irradiation was followed by an increase in cardiac output, heart rate, blood pressure, and calculated stroke volume, while peripheral resistance decreased. In the treated rats cardiac output did not increase despite an increase in the heart rate. Arterial pressure also increased but peripheral resistance did not. It is demonstrated that pyridoxine and pyridoxal modify the circulatory response; but the mechanism which prevents the cardiac output from increasing is not known. The increase in heart rate is probably due to heating and is unaffected by the vitamins.

A65-80757

THE EFFECTS OF HYPERBARIC OXYGENATION ON RETINAL ARTERIAL OCCLUSION.

Banks Anderson, Jr., Herbert A. Saltzman, and Albert Heyman (Duke U. School of Med., Durham, N.C.)

Archives of Ophthalmology, vol. 73, Mar. 1965, p. 315-319. 5 refs.

Grants NIH HE-07896, AM-01596, and E-236; and Neurol. Diseases and Blindness NB-00669.

Clinical and ophthalmologic findings following hyperbaric oxygenation in three patients with retinal arterial occlusive disease, caused by embolism or thrombosis of the central retinal artery or its branches, are reported. Clinically significant improvement attributable to hyperbaric oxygen therapy was not observed in any of the patients. Although it was possible by hyperbaric oxygenation to increase arterial oxygen concentrations by 1700% for as long as half an hour, no acute beneficial changes in visual function or in retinal edema occurred. Oxygen may not be the critical metabolite during hyperbaric oxygenation. The absence of improvement in case 1, where loss of function was reversible, may have resulted from deficiencies in the supply of other metabolic precursors or from the accumulation of byproducts which could not be removed in the absence of an effective circulation. It is also possible that the return of function or resolution of cloudy swelling requires more than 30 min when all necessary factors are present. The value of hyperbaric oxygenation in the treatment of retinal arterial occlusive disease remains to be established.

A65-80758

DETERMINATION OF THE ENERGY ABSORBED IN WATER FROM RELATIVISTIC COSMIC RAY PARTICLES USING THE CERENKOV EFFECT. S. C. Lillicrap (Inst. of Cancer Res., Phys. Dept.; Royal Cancer Hosp., and Royal Marsden Hosp., Great Britain).

Physics in Medicine and Biology, vol. 10, Jan. 1965, p. 17-24. 11 refs.

A method for measuring the dose received from high energy cosmic rays using a water Cerenkov detector is described. The amount of Cerenkov light produced is a measure of the energy absorbed in the detector from the incident particles. From an analysis of the shape of the spectrum of absorbed energies it is possible to estimate the contributions to the dose from the muon component and electron-photon component separately. A total whole-body dose rate of 26 ± 1.5 millirad/year was found. This figure would probably be reduced by 1 or 2 millirad/year inside buildings, due mainly to absorption of the electron-photon component.

A65-80759

TRANSISTORIZED RADIATION MONITOR.

M. J. McHugh (Manchester Reg. Center, Radiol. Protection Serv., Christie Hospital, and Holt Radium, Inst., Manchester, Great Britain).

Physics in Medicine and Biology, vol. 10, Jan. 1965, p. 107-108.

A portable radiation monitor used in a hospital for the routine monitoring of hospital waste, soiled laundry from the wards, and incinerator residues before removal from the hospital is described. The principal reason for this routine is to prevent the egress from the hospital of any radium needles inadvertently left in a dressing, etc. The instrument is light, gives both visual and aural indication of counting rate and is designed for single-handed operation. This leaves one hand free for the operator to manipulate long-handed tongs, maneuver linen bags, or divide up incinerator remains. For these practical reasons, this instrument is preferred for the location of lost radioactive sources and also the detection of gamma or beta contamination arising from the use of ¹³¹I, ³²P, or Au¹⁹⁸.

A65-80760

INVESTIGATION OF TIME RELATIONSHIP BETWEEN DISCHARGES IN MOTOR NEURONS OF ANTAGONISTIC MUSCLES IN HUMANS (BY MEANS OF CROSS CORRELATION ANALYSIS OF EMG) [ISSLEDOVANIYE SOOT-NOSHENII VO VREMENI RAZRIADOV MOTONEIRONOV MYSHTS-ANTAGONISTOV U CHELOVEKA (METODOM KROSSKORELIATSIONNOGO ANALIZA)].

R. S. Person (USSR, Acad. of Sci., Inst. of Higher Nervous Activity and Neurophysiol., Moscow). *Fiziologicheskii Zhurnal SSSR*, vol. 51, Jan. 1965, p. 71-75. 10 refs. In Russian.

In experiments on human subjects, no correlation was found in electromyograms of an antagonist pair of the upper arm muscles during voluntary movements, which indicated an independent process of excitation of motor neurons of each muscle. Involuntary contraction in the flexor, which resulted from a load attached to the wrist, produced a slight contraction of the antagonist induced by the radiation of excitation. In this case, a correlation in the electromyogram tracings of both muscles was noted with a time lag of 4 to 11 msec. This time interval may be interpreted as the time required for the impulses to travel from the acting muscle motor center to the center of the antagonist. This radiation evidently originates in the spinal cord. The use of cutaneous sensors to reveal this cross correlation would permit a statistical study of time discharge in different groups of motor neurons.

A65-80761

RELATIONSHIP BETWEEN CEREBRAL CORTEX, HYPOTHALAMUS AND MEDULLA OBLONGATA IN REGULATION OF BLOOD PRESSURE [O VZAI-MOOTNOSHENIYAKH KORY BOL'SHIKH POLUSHARI, GIPOTALAMUSA I PRODOLGOVATOGO MOZGA V REGULIATSII ARTERIAL'NOGO DAVLENIYA].

G. N. Smetankin (S. M. Kirov Med. Inst., Dept. of Normal Physiol., Gorki, USSR).

Fiziologicheskii Zhurnal SSSR, vol. 51, Jan. 1965, p. 76-83. 26 refs. In Russian.

Section of the bulbar vasomotor center of the medulla or local administration of aminazine in cats resulted in blood pressure fall. Simultaneously, the effect of stimulation of the vasomotor centers of the cerebral cortex, of the hypothalamus, and of the carotid sinuses was lost. Administration of strychnine, which causes elevation of vasomotor center excitability, elevated the blood pressure. Simultaneously, the stimulation of the cerebral cortex centers or the hypothalamus did not affect the pressor or depressor action evoked by stimulation of the corresponding centers of the medulla. During rest or anesthesia, the normal blood pressure and the sinocarotid reflexes were maintained by the medulla alone.

A65-80762

PEPTIDE SYNTHESIS FROM AMINO ACIDS IN AQUEOUS SOLUTION. Cytir Ponnampuruma and Erta Peterson (NASA, Ames Res. Center, Exobiol. Div., Moffett Field, Calif.).

Science, vol. 147, Mar. 26, 1965, p. 1572-1574. 14 refs

When an aqueous solution of glycine and leucine was exposed to ultraviolet radiation (1800 Å), at room temperature and pH 5, in the presence of cyanamide, 4 dipeptides and a tripeptide were formed. These were identified by the coincidence paper chromatography technique and the elution method for hydrolysis products as glycyl-glycine and glycyl-glycyl-glycine. Formation of peptides under relatively abiological conditions by ultraviolet light alone, or with an addition of cyanamide, which appears to enhance the yield, lends support to the hypothesis of chemical evolution.

A65-80763

DI-CYANDIAMIDE: POSSIBLE ROLE IN PEPTIDE SYNTHESIS DURING CHEMICAL EVOLUTION.

Gary Steinman, Richard M. Lemmon, and Melvin Calvin (Calif. U., Dept. of Chem. and Lawrence Radiation Lab., Berkeley).

Science, vol. 147, Mar. 26, 1965, p. 1574-1575. 5 refs.

AEC supported research.

A possible role of dicyandiamide in the peptide synthesis during chemical evolution was demonstrated by dehydration condensation of alanine. A dipeptide, alanylalanine, was formed at room temperature, in the dark, and at low hydrogen ion concentration. The dipeptide was identified by the coincidence paper chromatography technique. Because the presence of dicyandiamide in the early geological environment was indicated by previous laboratory work, the action of dicyandiamide may be another indication of chemical abiogenesis under conditions prevailing on the primitive earth.

A65-80764

RELATIONSHIP BETWEEN DURATION OF CARDIAC CYCLE AND VENTRICULAR EXCITATION TIME IN NORMAL HUMAN SUBJECTS AS COMPUTED BY THE WALLER-BAZETT EQUATION [O SOOTNOSHENIY MEZH DU DLITEL'NOST'YU SERDECHNOGO TSIKLA I VREMENEM VOZBUZHDENIYA ZHELUDOCHKOV SERDTS A ZDOROVYKH LIUDEI PO FORMULE WALLER-BAZETTA].

I. P. Pshenichnyi (Pedagogic Inst., Physiol. Lab., Khabarovsk, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 50, Sep. 1964, p. 1144-1149. In Russian.

The study of the relationship between the duration of the cardiac cycle and ventricular excitation time in normal human subjects, as computed by the Bazett formula, did not give the expected constant values, either for males or females. The time of the ventricular excitation did not depend upon

the duration of the cardiac cycle but was found to be an independent property of the cardiac muscle. The ratio computed by the formula fell between 0.32 and 0.42 in both males and females. The ratio expressed in percent, by the Chernogorov-Folgenson formula, also did not reflect the true function of the cardiac muscle.

A65-80765

DEVICE FOR CONTROLLED RESPIRATION IN INTACT ANIMALS [APPARAT DLIYA UPRAVLENIYA DYKHANIEM INTAKTNYKH ZHIVOTNYKH]. A. K. Kochetov, V. L. Popkov, and I. N. Cherniakov.

Fiziologicheskii Zhurnal SSSR, vol. 50, Dec. 1964, p. 1496-1499. 8 refs. In Russian.

A device is described which is suitable for the study of respiration on large experimental animals and permits regulation of constant pressure inside the mask. It can be used for pneumograms and electrograms of the abdominal aorta. It is also suitable for artificial respiration and for producing experimental hypocapnia.

A65-80766

EFFECT OF NITROGENOUS COMPOUNDS UPON GROWTH AND THE ATMOSPHERIC OXYGEN UPTAKE IN BLUE-GREEN ALGAE [VLIYANIE SOEDINENII AZOTA NA ROST SINE-ZELENYKH VODOROSLEI I FIKSATSIIU IMI MOLEKULIARNOGO AZOTA].

Mokhamed Samekh Takha.

Mikrobiologiya, vol. 33, 1964, p. 397-403. 22 refs. In Russian.

The blue-green algae *Anabaena variabilis* and *Hapalosiphon fontinalis* are able to use up ammonium and nitrate as a source of nitrogen for growth. In the presence of ammonium and nitrate salts these algae do not fix atmospheric nitrogen. *Calothrix Elenkinii* is able to use ammonium but not nitrates as a nitrogen source. In this respect it differs from all other blue-green algae so far studied. In the presence of ammonium salts no nitrogen fixation takes place in *Calothrix Elenkinii*; but in the presence of nitrates the algae fix atmospheric nitrogen.

A65-80767

Flicker.

H. E. Henkes and L. H. van der Tweel, ed.

(Proceedings of the Symposium on the Physiology of Flicker and Proceedings of the 2nd Symposium of the International Society for Clinical Electrophysiology (ISCERG) on Flicker Electroretinography, Amsterdam, September 9-11, 1963).

Edited by H. E. Henkes and L. H. van der Tweel. The Hague, The Netherlands, Dr. W. Junk Publishers, 1964, viii+540 p.

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20. RESPONSES OF THE BLOWFLY (*CALLIPHORA ERYTHROCEPHALA*) TO LIGHT FLASHES AND TO SINUSOIDALLY MODULATED LIGHT. J. T. Leutscher-Hazelhoff and J. W. Kuiper (Naturkundig Lab., Groningen, The Netherlands), p. 275-283. 13 refs.
21. CHANGES IN TIME SCALE AND SENSITIVITY IN LIMULUS OMMATIDIA. M. G. F. Fuortes and A. L. Hodgkin (Nat. Inst. of Health, Bethesda, Md., and Cambridge U., Physiol. Lab., England), p. 284-286. 5 refs.
22. RELATION BETWEEN PSYCHOPHYSICS AND ELECTROPHYSIOLOGY OF FLICKER. L. H. van der Tweel (Amsterdam U., Lab. of Med. Phys., The Netherlands), p. 287-304. 15 refs.
23. RECENT ADVANCES IN FLICKER-ELECTRORETINOGRAPHY. Harold E. Henkes (Rotterdam Med. School, Eye Clin., The Netherlands), p. 307-314. 8 refs.
24. SOME EXPERIENCE OF CLINICAL FLICKER ELECTRORETINOGRAPHY. Birgitta Zetterstrom (Karolinska Sjukhuset, Eye Clin., Stockholm, Sweden), p. 315-329. 12 refs.
25. THE ELECTRORETINOGRAM IN YOUNG CHILDREN (SINGLE STIMULUS, TWIN FLASHES AND INTERMITTENT STIMULATION). J. Francois and A. de Rouck (Ghent U., Ophthalmol. Clin., Belgium), p. 330-343. 6 refs.
26. THE PHOTOPIC COMPONENTS OF THE HUMAN ELECTRORETINOGRAM. CLINICAL RECORDING WITH A SLOW FLICKERING LIGHT STIMULUS. Ilmari Rendahl (Karolinska Sjukhuset, Eye Clin., Stockholm, Sweden), p. 344-351. 11 refs. (See A65-80778).
27. PHOTOPIC FLICKER ERG IN CASES OF CONGENITAL NIGHT BLINDNESS AND TOTAL COLOR BLINDNESS. Makoto Nagata (Kyoto U., Fac. of Med., Dept. of Ophthalmol., Japan), p. 352-366. 6 refs.
28. ELECTRORETINOGRAPHIC FINDINGS (INCLUDING FLICKER) IN CARRIERS OF CONGENITAL X-LINKED ACHROMATOPSIA. Bruce E. Spivey, Jerome T. Pearlman, and Hermann M. Burian (Iowa City U. Hosp., Dept. of Ophthalmol., Iowa), p. 367-375. 9 refs.
29. THE EFFECT OF SLOW INTERMITTENT LIGHT STIMULATION ON THE HUMAN ERG. Edgar Auerbach (Hadassah U. Hosp. and Med. School, Vision Res. Lab., Jerusalem, Israel), p. 376-391. (See A65-80779).
30. EINZELREIZ-UND FLIMMER-ERG IM AKUTEN STADIUM DER CHININVERGIFTUNG. K. Hommer and R. G. Frey (Wien U., Augenklin., Austria), p. 392-403. 11 refs. In German.
31. THE USE OF FLICKER-ELECTRORETINOGRAPHY IN THE JUDGEMENT OF THE RETINAL METABOLIC CONDITION IN DIABETES MELLITUS. A. L. A. van Poppel and I. Butler (Rotterdam Med. School, Eye Clin., The Netherlands), p. 404-411. 6 refs.
32. DAS ELEKTRORETINOGRAMM DER ISOLIERTEN MENSCHLICHEN NETZHAUT BEI EINZEL-UND FLIMMERREIZEN UND POTENTIALVERLAUFE AUS VERSCHIEDENEN NETZHAUTTIEFEN. Renate Hanitzsch and P. Dettmar (Karl-Marx-U., Physiol. Inst., Leipzig, Germany), p. 412-418. 6 refs. In German.
33. CLINICAL ELECTRORETINO-DYNAMOGRAPHY. Björn Wulffing (Karolinska Sjukhuset, Eye Clin., Stockholm, Sweden), p. 419-430.
34. EFFERENT INHIBITION OF SINGLE ERG-RESPONSES BY FLICKER-STIMULATION OF THE CONTRALATERAL EYE IN MAN. K. A. Hellner (Hamburg U.-Augenklin., Germany), p. 431-439. 12 refs. (See A65-80780).
35. THE INFLUENCE OF SUPPRESSION ON THE FLICKER ERG. A. T. M. van Balen (Rotterdam Med. School, Eye Clin., The Netherlands), p. 440-446. 5 refs. (See A65-80781).
36. IMPLICATIONS OF SELECTIVE AMPLIFICATION OF THE FLICKER-ELECTRORETINOGRAM. H. E. Henkes and L. H. van der Tweel (Rotterdam Med. School, Eye Clin.; and Amsterdam U., Lab. for Med. Phys., The Netherlands), p. 447-451. 6 refs.
37. A TECHNIQUE FOR EVALUATING PHOTOPIC AND SCOTOPIC FLICKER FUNCTION WITH ONE LIGHT INTENSITY. Alex E. Krill (Chicago U., Dept. of Surg., Ill.), p. 452-461. 6 refs.
38. A SIMPLIFIED SET-UP FOR CLINICAL ELECTRORETINOGRAPHY. THE ERG RECORDED AT HIGH STIMULUS AND ADAPTATION LEVELS. Akira Nakajima, H. Kaneko, T. Sigumachi, and O. Nakagawa, p. 462-472. (See A65-80782).
39. VISUAL EVOKED RETINAL AND OCCIPITAL POTENTIALS. Richard M. Copenhaver, Gilbert D. Beinhocker, and Nathan W. Perry, Jr. (Fla. U., Coll. of Med., Ophthalmol. and Psychol. Serv., Gainesville), p. 473-482. 6 refs. (See A65-80783).
40. ERFAHRUNGEN MIT KLINISCHER FLIMMER-ELEKTRORETINOGRAPHIE BEI VERSCHIEDENEN BLITZFREQUENZEN. E. Schmöger and W. Zimmer (Med. Akad. Erfurt, Augenklin., Germany), p. 483-491. 5 refs. In German.
41. FLICKER-ERG IN MACULAR DISEASE. PROBLEMS OF STIMULUS AND RECORDING. Jerry H. Jacobson and George Stephens (Cornell U. Med. Coll., Dept. of Surg. (Ophthalmol.), New York, N.Y.), p. 492-507.
42. SOME FACTORS INFLUENCING THE FREQUENCY RESPONSE OF THE HUMAN ERG. P. Stoutenbeek, H. F. E. Verduyn Lunel, and L. H. van der Tweel (Amsterdam U., Lab. of Med. Phys., The Netherlands), p. 508-514. 6 refs.
43. ELECTRO-RETINOGRAPHIC CRITICAL FUSION FREQUENCY OF THE RETINA IN RELATION TO THE HISTOLOGICAL DEVELOPMENT IN MAN AND ANIMALS. G. P. M. Horsten and J. E. Winkelman (Nijmegen, Catholic U., Lab. of Gen. Physiol.; Amsterdam U., Eye Clin.; and Onze Lieve Vrouwe Gasthuis, Amsterdam, The Netherlands), p. 515-521. 9 refs.
44. NON-INDEPENDENCE OF RED AND BLUE ERG RESPONSES EVOKED BY INTERMITTENT STIMULATION. Anna Maria Ercoles (Ist. Nazionale di Ottica, Florence, Italy), p. 522-528. 5 refs.
45. DECAY OF SUPPRESSION OF RETINAL FUNCTION AFTER SHORT FLASHES OF LIGHT; ELECTRORETINOGRAPHIC MEASUREMENTS IN THE DARK ADAPTED HUMAN EYE. Valter Elenius (Turku U. Central Hosp., Dept. of Ophthalmol., Finland), p. 529-536. 8 refs. (See A65-80784).

A65-80768

NONLINEAR AND SPATIAL EFFECTS IN THE PERCEPTION OF FLICKER. John Levinson (Bell Telephone Labs., Inc., Murray Hill, N.J.) (Symposium on the Physiology of Flicker, Amsterdam, September 9-11, 1963, Proceedings).

Edited by H. E. Henkes and L. H. van der Tweel. The Hague, The Netherlands, Dr. W. Junk Publishers, 1964, p. 36-55. 6 refs. (See A65-80767)

The frequency of suprathreshold flicker is discriminated by a nonlinear process which consists of a time-count of below average intensity minima. This nonlinear process appears to follow some linear low-pass filtering, but not as much as is suggested by the steep high-frequency slopes of De Lange's results. Finally, a low-frequency inhibitory interaction exists between adjacent elements of the visual field. This inhibition may account for most of the limitation of sensitivity to flicker at frequencies below approximately 10 cps. The decreasing strength of this interaction for higher frequencies may account for the pseudoresonance effect.

A65-80769

PHASE SHIFT OF ALTERNATING COLOURED STIMULI.

P. L. Walraven and H. J. Leebeek (Inst. for Perception RVO/TNO, Soesterberg, The Netherlands).

IN: FLICKER. (Symposium on the Physiology of Flicker, Amsterdam, September 9-11, 1963, Proceedings).

Edited by H. E. Henkes and L. H. van der Tweel. The Hague, The Netherlands, Dr. W. Junk Publishers, 1964, p. 56-71. 9 refs. (See A65-80767).

De Lange found that with alternation of colored stimuli sometimes a subjective luminance variation exists, even when the luminances of the stimuli are equal. One can avoid this luminance flicker by changing the phase between the stimuli. This is thought to be a compensation for a phase shift between the responses to these stimuli somewhere in the retinocortical system. These phase shifts are measured for a number of wavelength combinations ranging from 460 to 675 nm, with intervals of some 20 nm, at a retinal illumination of 2 trolands and with a 2° field. The phase angles turn out to be approximately additive. De Lange's suggestion to interpret these phase shifts in terms of more basic phase shifts between the responses of the fundamental color mediating systems has been worked out. An interpretation is given in terms of the Young-Helmholtz theory of color vision. Second order nonlinear effects cause small distortions of this simple model. The possible influence of the phase shift on the determination of the luminosity curve with heterochromatic flicker is discussed.

A65-80770

THE ATTENUATION CHARACTERISTICS OF THE VISUAL SYSTEM DETERMINED BY MEASUREMENTS OF FLICKER THRESHOLD, BRIGHTNESS AND PUPIL MOTOR EFFECT OF MODULATED LIGHT. F. W. Campbell and J. G. Robson (Physiol. Lab., Cambridge, England). IN: FLICKER.

(Symposium on the Physiology of Flicker, Amsterdam, September 9-11, 1963, Proceedings).

Edited by H. E. Henkes and L. H. van der Tweel. The Hague, The Netherlands, Dr. W. Junk Publishers, 1964, p. 83-84. (See A65-80767).

Attenuation characteristics of the human visual system were determined by measuring flicker threshold and brightness and pupillomotor effect of modulated light. Modulating light not only made it appear brighter but also made it more effective in constricting the pupil. Thus it was possible to make measurements of effective luminance increment (ELI) using the absence of change in pupil diameter to indicate the equivalence of successively presented modulated and unmodulated fields. This method of determining ELI yielded results similar to those obtained psychophysically.

A65-80771

PHYSIOLOGICAL ASPECTS OF FLICKER ELECTRORETINOGRAMS: COMPONENTS AND FREQUENCY CHARACTERISTICS [PHYSIOLOGISCHE ASPEKTE DES FLIMMERELEKTRORETINOGRAMMS: KOMPONENTEN UND FREQUENZCHARAKTERISTIK]. H. Bornschein (Wien U., Physiol. Inst., Austria). IN: FLICKER.

(Symposium on the Physiology of Flicker, Amsterdam, September 9-11, 1963, Proceedings).

Edited by H. E. Henkes and L. H. van der Tweel. The Hague, The Netherlands, Dr. W. Junk Publishers, 1964, p. 85-100. 58 refs. In German. (See A65-80767).

Several physiological aspects of the human flicker electroretinogram (ERG) were studied in some detail. With improved recording technique retinal flicker potentials can be demonstrated to occur with frequencies well above the subjective fusion point. The complex pattern of flicker ERG is shown to result from interference between scotopic and photopic components. Under photopic conditions the off-effect contributes essentially to the pattern. Some effects specific for flicker ERG are discussed which cannot be revealed by a study of single flashes (alternating waves, initial suppression of flicker waves). Special attention is given to sinusoidally modulated light used in recent studies for the isolation of retinal components. The frequency characteristics of the flicker components have also been treated as well as the technique of selective amplification of the flicker ERG. At the end of the review reference is made to most recent developments in electronic averaging techniques of retinal responses irrespective of their characteristics.

A65-80772

ELECTROENCEPHALOGRAPHY DURING STIMULATION WITH FLICKERING LIGHT.

W. Storm van Leeuwen (Utrecht U. Hosp., Neurol. Clin., EEG Dep.; and Inst. of Med. Phys. TNO, The Netherlands). IN: FLICKER.

(Symposium on the Physiology of Flicker, Amsterdam, September 9-11, 1963, Proceedings).

Edited by H. E. Henkes and L. H. van der Tweel. The Hague, The Netherlands, Dr. W. Junk Publishers, 1964, p. 151-156. (See A65-80767).

Approximately a million electroencephalograms (EEG) were recorded while intermittent photic stimulation was applied and the effect of flickering light on the EEG was studied. A comparatively small result was obtained. Increased response to photic stimulation was related without proof to increased cerebral excitability; some forms of increased reactivity to flicker were related with very much more reason to headache but these and some other empirical observations remain of comparatively minor importance. A bilateral absence of response to flicker until now has no clinical significance. Recently the interest in investigations of the EEG response to flickering light has gained new impetus due to the following two factors: (1) increasing use of automatic analysis for the study of the responses, and (2) the introduction of a new form of photic stimulation with sinusoidally modulated light. It seems likely that the combination of these two factors may lead to a new approach, not only in neurophysiology, but also in clinical diagnostic investigation. The relationship between psychophysics and neurophysiology in studying vision is discussed.

A65-80773

DESCRIPTION OF CORTICAL AND OCULAR RESPONSES TO INTERMITTENT LIGHT STIMULATION IN MAN [DESCRIPTION DES RESPONSES CORTICALES ET OCULAIRES A LA STIMULATION LUMINEUSE INTERMITTENTE (SLI) CHEZ L'HOMME].

Antoine Rémond (Lab. d'EEG et de Neurophysiol. Appl., Paris, France). IN: FLICKER.

(Symposium on the Physiology of Flicker, Amsterdam, September 9-11, 1963, Proceedings).

Edited by H. E. Henkes and L. H. van der Tweel. The Hague, The Netherlands, Dr. W. Junk Publishers, 1964, p. 157-193. 16 refs. In French. (See A65-80767).

A detailed study of the electrical phenomena of the response to light in the intact and waking human reveals the more or less complete participation of the whole surface of the head. A preliminary topographical study gives more precise information about the general features of the activity of each region. The chronology as well as the topography of the response give some indications about the structure of its complexity. The types of response that could be taken as a reference show variants underlining the importance of certain factors which work together to give them their form. Some of them such as the stimulation period, the eyelid, the eyeball, and the retinal quadrant, could direct the final physiological studies and the clinical investigations which could make use of them.

A65-80774

RELATIONS BETWEEN ELECTRORETINOGRAMS AND OCCIPITAL POTENTIALS ELICITED BY FLICKERING STIMULI.

John C. Armington (Walter Reed Army Inst. of Res., Washington, D.C.). IN: FLICKER.

(Symposium on the Physiology of Flicker, Amsterdam, September 9-11, 1963, Proceedings).

Edited by H. E. Henkes and L. H. van der Tweel. The Hague, The Netherlands, Dr. W. Junk Publishers, 1964, p. 194-206. 13 refs. (See A65-80767).

Simultaneous recordings of the ERG and the occipital potentials were made with human subjects and flickering stimuli. It was found that both the ERG and the occipital response increased in size when the luminance of the stimulus was increased, when its area was increased, or when both were increased. It was found that both responses rapidly adapted to flickering stimuli. The spectral sensitivity of the occipital response was found to be relatively more photopic than that of the retina.

A65-80775

ACTION OF COLOUR FLICKER STIMULI ON THE ELECTRICAL RESPONSES OF RETINA AND OPTIC CORTIX IN MAN.

Marcel Monnier, O. Vatter, and L. Hösli (Physiol. Inst. Basel, Switzerland). IN: FLICKER.

(Symposium on the Physiology of Flicker, Amsterdam, September 9-11, 1963, Proceedings).

Edited by H. E. Henkes and L. H. van der Tweel. The Hague, The Netherlands, Dr. W. Junk Publishers, 1964, p. 207-220. (See A65-80767).

The analysis with an electronic computer of the cortical responses to photic stimulation of the retina with low frequency flashes (1 to 2 per sec) confirmed the b-, c-, and d-components previously identified by an earlier investigator. From these components the initial b-potential, usually negative in the supratrochlear lead, is specific of the visual sensitivity. It starts 42.5 msec and culminates 67 msec after the onset of the stimulus. Another specific component is the off-effect which culminates 69 msec after the end of a long flash stimulus (200 msec). At higher flicker frequencies (over 4 cps), the b- and c-components of the initial cortical responses become gradually smaller. Over 16 per sec only a small positive c-like potential is detectable, synchronous with the stimulus. The influence of the stimulus wavelength on the cortical response is detectable only at low flicker frequency, that is at 1 or 2 per sec. The most striking influence is a slight amplitude increase of the initial b-potential and of the off-effect in response to red flashes.

A65-80776

A STUDY OF THE VARIABILITY OF RESPONSE TO FLICKER: THE INFLUENCE OF OTHER SENSORY STIMULI.

Mary A. B. Brazier (Calif. U., Brain Res. Inst., Los Angeles). IN: FLICKER.

(Symposium on the Physiology of Flicker, Amsterdam, September 9-11, 1963, Proceedings).

Edited by H. E. Henkes and L. H. van der Tweel. The Hague, The Netherlands, Dr. W. Junk Publishers, 1964, p. 224-237. (See A65-80767). Contract Nonr 233(69); Grant PHS NB 04773.

In an attempt to regulate the many controls necessary when making quantitative observations of the brain's response to flicker, it was found that the presence or absence of stimulation of other sensory modalities exerted an influence. Experiments are described in both man and animal, in which a click was paired with a flash and the influence of each on the response to the other was studied by computer analysis. Examples are given of experiments in which some components of these responses are enhanced, others are diminished. It is hypothesized that relative stimulus strength may be the factor deciding which effect becomes the dominant one although individual differences in sensitivity doubtless exist. Computer studies of the variability of the potential differences that compose the average curve reveal the changes that develop during long periods of stimulation.

A65-80777

THE INFLUENCE OF ATTENTION ON THE OCCIPITO-CORTICAL RESPONSES TO LIGHTFLASHES IN MAN.

M. W. van Hof (Leyden U., Dept. of Physiol., Psycho-physiol. Div., The Netherlands).

IN: FLICKER.

(Symposium on the Physiology of Flicker, Amsterdam, September 9-11, 1963, Proceedings).

Edited by H. E. Henkes and L. H. van der Tweel. The Hague, The Netherlands, Dr. W. Junk Publishers, 1964, p. 238-244. 6 refs. (See A65-80767).

Human occipitocortical responses to intermittent photic stimulation were studied. In the majority of the subjects the most obvious effect of image formation on the flickering screen was amplitude reduction in those components occurring more than approximately 100 msec after the beginning of the flash. It is argued that this effect is caused by the image formation on the retina as such and not by the activity of some "attention mechanism". In 15 subjects a comparison of the effect of image formation and that of flash-counting was made. In 13 of these subjects the above mentioned effect of image formation was seen. Only 1 of these 15 subjects showed systematic changes due to flash-counting, namely an increase of the first negative wave (80 msec after the start of the flash), whereas image formation in the same subject gave amplitude reduction of later components. This reaction to flash-counting was the only instance where it was necessary to postulate the activity of an "attention mechanism".

A65-80778

THE PHOTOPIC COMPONENTS OF THE HUMAN ELECTRORETINOGRAM: CLINICAL RECORDING WITH A SLOW FLICKERING LIGHT STIMULUS. Ilmari Rendahl (Karolinska sjukhuset, Eye Clin., Stockholm, Sweden).

IN: FLICKER.

(Symposium of the International Society for Clinical Electrophysiology on Flicker Electrophysiology, Rotterdam, September 12-14, 1963, Proceedings).

Edited by H. E. Henkes and L. H. van der Tweel. The Hague, The Netherlands, Dr. W. Junk Publishers, 1964, p. 344-351. 11 refs. (See A65-80767).

When the eye is stimulated by a slow flickering light (1/sec.; same period of light and dark) of high intensity, a photopic electroretinogram (ERG) composed of 2 negative and 4 positive wavelets is recorded. Earlier studies have shown that the third positive wave is missing in normal eyes during red light adaptation, as well as in some subjects with protanopia (Group I). In green light adaptation the fourth positive wave is suppressed in normal eyes but not in some cases of deuteranopia (Group I). In other cases the findings are complicated. In protanomaly the overall size of the wavelets may be very small (Group I), and no certain third positive wave can be seen. In other subjects (Group II) there is an ordinary photopic ERG with 4 positive wavelets, but the third wave is not suppressed by red light adaptation. In optic neuritis the photopic ERG is normal. In three cases of macular changes, the ERG showed a fifth positive wavelet. This component is supposed to be a rod component, the suppressing effect of the cones being perhaps reduced because of the macular degeneration.

A65-80779

THE EFFECT OF SLOW INTERMITTENT LIGHT STIMULATION ON THE HUMAN ERG.

Edgar Auerbach (Hadassah U. Hosp. and Med. School, Vision Res. Lab., Jerusalem, Israel).

IN: FLICKER.

(Symposium of the International Society for Clinical Electrophysiology on Flicker Electrophysiology, Rotterdam, September 12-14, 1963, Proceedings).

Edited by H. E. Henkes and L. H. van der Tweel. The Hague, The Netherlands, Dr. W. Junk Publishers, 1964, p. 376-391.

Natl. Council, to Combat Blindness, Inc., New York, N.Y. supported research. (See A65-80767).

A description of the pattern of the normal ERG including the recovery of the individual potentials following light adaptation is given. The effect of slow intermittent stimulation on the potentials of the ERG in advanced dark adaptation is demonstrated, using ranges from one per second up to one every 30 seconds. With the increase of the interval between stimuli the effect on the ERG produced by successive stimuli becomes smaller. Stimuli at intervals from one second to four seconds produced a maximal effect on the potentials of the ERG with the second stimulus. A steady state is established during the continuance of the train of stimuli. Successive stimuli at intervals beyond about 4 seconds up to about 15 seconds gradually build up an increasing response. The changes in the electrical responses described are not detectable if the interval between stimuli is more than 25 seconds. The relationship of these findings to a photochemical and a neural effect in the retina is discussed.

A65-80780

EFFERENT INHIBITION OF SINGLE ERG-RESPONSES BY FLICKER-STIMULATION OF THE CONTRALATERAL EYE IN MAN.

K. A. Hellner (Hamburg U.-Augenklin, West Germany).

IN: FLICKER.

(Symposium of the International Society for Clinical Electrophysiology on Flicker Electrophysiology, Rotterdam, September 12-14, 1963, Proceedings).

Edited by H. E. Henkes and L. H. van der Tweel. The Hague, The Netherlands, Dr. W. Junk Publishers, 1964, p. 431-439. 12 refs. (See A65-80767).

ERG potentials evoked by flicker stimulation of the contralateral eye and by bilateral double stimuli were measured simultaneously at both retinas in men. Potentials elicited by double stimuli show an identical behavior in both eyes. No signs of mutual influence could be demonstrated. A decrease of the amplitude of the b-wave in one eye was observed depending in height upon the frequency of a simultaneous flicker stimulation of the contralateral eye. Below flicker fusion frequency a maximum inhibitory effect on the single ERG responses was found. It is supposed that a nonphotochemical adaptation process alters the excitability of the retina. This might be brought about by impulses of centrifugal fibers activating a complicated feedback system.

A65-80781

THE INFLUENCE OF SUPPRESSION ON THE FLICKER ERG.

A. T. M. van Balen (Rotterdam Med. School, Eye Clin., The Netherlands).

IN: FLICKER.

(Symposium of the International Society for Clinical Electrophysiology on Flicker Electrophysiology, Rotterdam, September 12-14, 1963, Proceedings).

Edited by H. E. Henkes and L. H. van der Tweel. The Hague, The Netherlands, Dr. W. Junk Publishers, 1964, p. 440-446. 5 refs. (See A65-80767).

The evoked occipital responses on flicker stimulation of the attentively reading eye have a significantly higher amplitude than the same responses on flicker stimulation of the suppressed eye. An effect of attention in the flicker ERG is not sufficiently demonstrated. If anything can be said about the influence of attention on the ERG it is the reverse of that on the occipital responses, i.e., attention lowers the amplitude of the ERG.

A65-80782

A SIMPLIFIED SET-UP FOR CLINICAL ELECTRORETINOGRAPHY. THE ERG RECORDED AT HIGH STIMULUS AND ADAPTATION LEVELS.

Akira Nakajima, H. Kaneko, T. Sugumachi, and O. Nakagawa.

IN: FLICKER.

(Symposium of the International Society for Clinical Electrophysiology on Flicker Electrophysiology, Rotterdam, September 12-14, 1963, Proceedings).

Edited by H. E. Henkes and L. H. van der Tweel. The Hague, The Netherlands, Dr. W. Junk Publishers, 1964, p. 462-472. (See A65-80767).

A simplified setup for clinical electrophysiology is described consisting of a portable electrocardiograph and a xenon flash unit. Special attention is paid to the electrophysiological responses found under very strong light conditions obtained with the fundus camera. The electrophysiological (ERG's) recorded at different levels of light adaptation, strength and wave-length of stimuli, and background are discussed as well as the ERG changes recorded in the initial stage of dark adaptation after different levels of pre-adaptation. Finally, the ERG recorded under local retinal stimulation is discussed. The results obtained indicate the ample possibilities for clinical application of these techniques. By letting the retina shout, rather than murmur, the signal-to-noise ratio can be increased at least in a number of cases.

A65-80783

VISUAL EVOKED RETINAL AND OCCIPITAL POTENTIALS.

Richard M. Copenhaver, Gilbert D. Beinhocker, and Nathan W. Perry, Jr.

(Fla. U., Coll. of Med., Ophthalmol. and Psychol. Serv., Gainesville).

IN: FLICKER.

(Symposium of the International Society for Clinical Electrophysiology on Flicker Electrophysiology, Rotterdam, September 12-14, 1963, Proceedings).

Edited by H. E. Henkes and L. H. van der Tweel. The Hague, The Netherlands, Dr. W. Junk Publishers, 1964, p. 473-482. 6 refs. (See A65-80767).

Evoked retinal and occipital potentials have been recorded from stimulation of each eye of several subjects at the same sitting using identical stimulus and recording conditions. Similar studies were performed on some subjects with one abnormal eye which could be compared to the other normal eye. Evoked occipital potentials can be recorded from small, dim light stimuli which are insufficient to evoke detectable retinal potentials under the same circumstances. Because of the greater sensitivity achieved through occipital recording the blind spot could be detected. The spatial resolution obtained when recording evoked retinal potentials was insufficient to reveal the blind spot scotoma. However, spatial differences in recording evoked retinal potentials were evident and should be useful in distinguishing between localized retinal disease and discrete lesions located more posteriorly in the visual system.

A65-80784

DECAY OF SUPPRESSION OF RETINAL FUNCTION AFTER SHORT FLASHES OF LIGHT. ELECTRORETINOGRAPHIC MEASUREMENTS IN THE DARK ADAPTED HUMAN EYE.

Valter Elenius (Turku U. Central Hosp., Dept. of Ophthalmol., Finland).
IN: FLICKER.

(Symposium of the International Society for Clinical Electroretinography on Flicker Electroretinography, Rotterdam, September 12-14, 1963, Proceedings).

Edited by H. E. Henkes and L. H. van der Tweel. The Hague, The Netherlands, Dr. W. Junk Publishers, 1964, p. 529-536. 8 refs. (See A65-80767).

When the dark adapted human eye is stimulated with pairs of single flashes of light of 5 lux intensity and 125 msec duration, the difference in size of the b-waves of the two electroretinograms (ERG's) evoked, as related to the dark interval between the stimuli, indicates exponential decay of the suppression caused by the first stimulus. When a flickering light of constant one-to-five light/dark ratio is used for stimulation and the difference in size between the first b-wave and the constant amplitude of the flicker ERG is related to the dark interval between the flickering stimuli, the exponential formula of decay of suppression is not strictly obeyed. It is concluded that the constant amplitude response of the flicker ERG or the amplitude of the second b-wave evoked by a pair of flashes, depends both on the duration of the light stimuli and the duration of the dark interval between the stimuli. A quantitative method is suggested of using pairs of single flashes for stimulation in clinical electroretinography.

A65-80785

THE SELECTION INTERVIEW SINCE 1949.

Lynn Ulrich and Don Trumbo (Kan. State U., Lawrence).

Psychological Bulletin, vol. 63, Feb. 1965, p. 100-116. 75 refs.

Research literature on the selection interview since 1949 is reviewed. Major sections include validity studies, studies dealing with the accuracy of information obtained in the interview, and analytic and model-testing studies. Validity evidence is generally confounded in that the predictions which are validated are made on the basis of both the face-to-face interview and other ancillary data. However, the bulk of the evidence favors both the structured interview and interviews limited in purpose. Recurring evidence suggests that the interview may be most successful if limited to the assessment of personal relations and career motivation. Recent analytic studies involving content analyses and decision-making processes show promise of providing new insights into the interview process.

A65-80786

INFLUENCE OF CENTRAL AND PERIPHERAL PCO_2 (pH) ON THE VENTILATORY RESPONSE TO HYPOXIC CHEMOCEPTOR STIMULATION.

J. W. Riedstra (Leyden U., Dept. of Physiol., The Netherlands).

Acta Physiologica et Pharmacologica Neerlandica, vol. 12, 1963, p. 407-452. 35 refs.

In experiments on nembutal-anesthetized cats, where the peripheral chemoceptors are supplied from the general circulation, while the bulbar respiratory center is separately perfused, ventilation is determined as a function of arterial oxygen partial pressure at constant alveolar PCO_2 and constant bulbar P_{O_2} , with either bulbar PCO_2 or base excess as a parameter. The hyperoxic ventilation level V_0 , is, upon decrease of the oxygen content of the breathing mixture, maintained until a critical value, p_c , of PCO_2 is reached; beyond this point it increases; in this region ventilation is a linearly decreasing function of $\log P_{aO_2}$; the ventilatory response can thus, over the whole range of oxygen partial pressures, be expressed in terms of V_0 , p_c , and the slope Y , of the $V/\log P_{aO_2}$ line in the hypoxic range. It is concluded that, in the acid excess range, an increase in fixed acid has two opposite effects on the setting of p_c , which in this range, is determined by central pH on the one hand and by the influence of peripheral pH on hypoxic stimulation of the peripheral chemoceptors on the other. It is shown that, on the basis of the data gained, the ventilatory reaction to hypoxia of the intact organism can be reconstructed.

A65-80787

PERCEPTION AND NEURAL REPRESENTATION OF SIMULTANEOUS DICHOTIC PURE TONE STIMULI.

D. W. Odenthal (Leyden U., Dept. of Physiol., Psychophysiol. Div., The Netherlands).

Acta Physiologica et Pharmacologica Neerlandica, vol. 12, 1963, p. 453-496. 51 refs.

Studies of the pitch of single and double intertones perceivable when two pure tone stimuli of slightly different frequencies are offered dichotically to the ears are presented. The range from 200 to 10 000 cps was covered (subrange 300 to 3000 cps in 100 cps steps; subrange 3000 to 10 000 cps in 1000 cps steps). It was found that, in the range below 100 cps, an approximately constant frequency difference of 11 to 14 cps is needed to obtain a just noticeable interaural pitch difference; between 100 and 1500 cps the limen rapidly increases to 60 to 75 cps, i.e., about 5%. Percentage sensitivity then remains constant up to about 2400 cps, when a second sharp rise occurs; the limen reaches a value of 300 cps (or 10%) at 3000 cps; beyond this frequency, percentage sensitivity remains constant. Behavior of single and double intertone pitches in the frequency range below 1000 cps is different from that in the higher frequency range. In the lower range, the pitch of the beating single intertone

is equal to that of a diotically heard pure tone of a frequency equal to the arithmetic mean of the frequencies offered. In the range over 1000 cps, the image does not beat and the pitch is lower than that corresponding to the arithmetic mean. An explanation of the behavior of intertone pitches is attempted. It is concluded that, in man, where direct electrophysiological experimentation is impossible, the central representation of the pure tone stimulus is similar to that found in the cat, guinea pig, and monkey.

A65-80788

THE HAZARDS OF LOW VOLTAGE RADIATION.

Louis Pelis, Jr. (Gen. Telephone Co. of Ind., Fort Wayne).

Industrial Medicine and Surgery, vol. 33, Dec. 1964, p. 866-868.

A discussion is presented of the hazards from microwaves of short wave radio energy. With the event of modern electronics there has been an increase of devices capable of producing microwave radiation, such as radar transmitters, radio relay systems, and others. Since heating of the tissue seems to be the most dangerous hazard found so far, the thermal effects are discussed in some detail. The armed forces who have expressed a great interest in this field have urged for and initiated an American Standards Association. The Navy's Radiation Hazards program (Rad Haz) is described, and objectives of the program in biological areas are pointed out. Problems in carrying out the program are mentioned. Much of the program is underway or completed, and recommendations have been made. A list is given of some recommendations for prevention of microwave injury.

A65-80789

THREE CASES OF APPARENT CHEMICAL BURNS OF THE HANDS FOLLOWING CONTACT WITH A MAGNETRON TUBE.

I. A. Marriott (Inst. of Aviation Med., Toronto, Ontario, Canada).

(Canadian Forces Medical Service, 5th Annual Clinical Conference, Toronto, Ontario, April 13-15, 1964).

Medical Services Journal Canada, vol. 20, Jun. 1964, p. 546-552. 12 refs.

This paper reports the cases of three airmen who suffered apparent chemical burns to their hands after handling a failed magnetron tube, and a fourth individual who apparently removed the offending chemical from his hands before injury could take place. The injuries were originally thought to have been caused by a rhodium compound, but investigation has failed to reveal any evidence of rhodium toxicity, or indeed of any material likely to have caused these injuries. A list of the metals used in making the tube are given. The magnetron tube is an electronic tube emitting a given radio frequency, and is designated type 7182.

A65-80790

LEADERSHIP IN SMALL GROUPS: A MATHEMATICAL APPROACH.

Arnold Binder (Ind. U., Bloomington and Indianapolis), Burton R. Wolin, and Stanley J. Terebinski (System Develop. Corp., Santa Monica, Calif.).

Journal of Experimental Psychology, vol. 69, Feb. 1965, p. 126-134. 8 refs. System Develop. Corp. supported research.

The broad purpose of this research was the investigation of the relationship between decision-making success and the likelihood of being voted leader (group decision maker) of a 3-man group. Markov models, based on extensions of concepts used in mathematical learning theory, provided the theoretical framework. Each trial of the experiment began with the selection of a leader by group vote, and ended after the designated leader made a decision for the group. Obtained and predicted results were compared for voting shifts, asymptotic leadership and state proportions, and learning trends. Five different reinforcement groups were run, and in only one of these groups were there major discrepancies between actual and expected results.

A65-80791

EFFECTS OF DIFFERENTIAL VALUE ON RECALL OF VISUAL SYMBOLS.

Harvey A. Taub (Mass. U., Amherst).

Journal of Experimental Psychology, vol. 69, Feb. 1965, p. 135-143. 13 refs.

Contract AF 19(628)-290.

The effects of differential ratio of value, exposure time, and number of categories upon the detection and report of letters were investigated in a visual search task. The differential ratios of value of the letters were 2:1, 4:1, 8:1, and 16:1; the exposure times of the stimulus slides were 0.5, 1.5, and 2.5 sec.; and the numbers of categories on a slide were 4, 6, 8, 10, and 12 letters. The results indicated that subjects made more correct identifications, initial responses, and false reports of higher value symbols than of lesser value. Further, the percentage of correct identifications and percentage of initial responses of higher value symbols varied with exposure time and ratio. These effects were attributed to selective recall from short-term memory storage.

A65-80792

BASES FOR PREFERENCES AMONG THREE-OUTCOME BETS.

Sarah Lichtenstein (Mich. U., Ann Arbor).

Journal of Experimental Psychology, vol. 69, Feb. 1965, p. 162-169. 10 refs. Grant AFOSR 192-63.

This experiment compared the moment functions of a bet as predictors of choices among bets with the subjectivity expected utility (SEU) maximization model. Bet parameters of Expected Value (EV), Variance (V), Skewness (Sk), and probabilities were independently varied in 182 3-outcome bets. Each of the 12 subjects bid on each bet and played some bets for real money. Subjects preferred high EV and low V, but had no preferences with Sk or probability levels. Sets of bets existed which were equal in all parameters; within such sets, subjects preferred bets with the largest least likely amount. The moment-function approach was rejected; the SEU model was not. A lexicographic ordering of variables was suggested.

A65-80793

APPARENT SPATIAL POSITION AND THE PERCEPTION OF LIGHTNESS. Jacob Beck (Harvard U., Cambridge, Mass.)

Journal of Experimental Psychology, vol. 69, Feb. 1965, p. 170-179. 12 refs.

Grant NSF GB-94; PHS M-05120-02.

Two studies investigated the relation of lightness perception to the perception of spatial position. The results confirm earlier findings that lightness perception may be affected by how an observer perceives the surface to be oriented with respect to the illumination. The results fail to support the hypothesis, however, that the apparent position of a surface relative to the illumination is used as a basis for computing the albedo of a surface. Rather, the general hypothesis that the studies appear to support is that processes of perceptual organization come into play as a result of the cue properties of stimuli which affect whether a variation in luminance will be seen as a difference in the illumination of the surface or as a difference in the lightness of the surface. Thus, an area of reduced surface luminance seen in one position as a shadow is, in another, seen as a grey surface color, in each case consistent with the apparent position of the surface.

A65-80794

MONOPTIC AND DICHOPIC VISUAL MASKING BY PATTERNS AND FLASHES.

Peter H. Schüller (Mass. Inst. of Technol., Cambridge).

Journal of Experimental Psychology, vol. 69, Feb. 1965, p. 193-199. 15 refs.

Grant NIH 3TGM-1064.

This study investigated masking of letters by a bright flash of light or by a pattern. The results showed that (a) masking by flash is primarily a monoptic effect; masking by pattern occurs under monoptic and dichoptic conditions; (b) increasing the interstimulus interval decreases masking by pattern less than by monoptically present flash; and (c) repetition of trials decreases masking by pattern but not by flash. Different processes are involved when flashes and patterns are used as masking stimuli.

A65-80795

CHARACTER OF HOMEOSTATIC RESPONSE DURING HYPOXIC HYPOXIA IN DOGS OF DIFFERENT AGE GROUPS (OSOBENNOSTI GOMEOSTATICHESKOI REAKTSII PRI GIPOKSIKESKOI GIPOKSII U SOBAK RAZLI-CHNYE VOZRASTNYE PERIODY).

I. S. Ugolbaeva (USSR, Acad. of Med. Sci., Inst. of Normal and Pathol. Physiol., Moscow).

Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 58, Sep. 1964, p. 34-39. 18 refs. In Russian.

In full grown dogs and puppies, in whom cardiac activity was already under the inhibitory influence of the vagus, homeostasis was maintained during stepwise simulation of high altitudes in a pressure chamber, from 2,000 to 6,000 m, in two phases: bradycardic and tachycardic. In younger puppies, 1 to 16 days old, whose vagus tonus had not yet been developed, the character of the homeostatic response to hypoxia was found to be considerably different, and only tachycardia was noted. Puppies of 18 days or 3 months showed better ability to adjust to changes in altitude than the very young animals but did not reach the degree noted in the full-grown animals. The conclusion may be drawn that younger animals show lower tolerance to hypoxia than the full-grown ones.

A65-80796

ELEVATION OF THE THERMOSTABILITY THRESHOLD IN ANIMALS (O POVYSHENII PREDELA THERMO-STOICHIVOSTI ZHIVOTNYKH).

V. D. Lindenbraten and S. D. Krylov.

Patologicheskaya Fiziologiya i Eksperimental'naya Terapiya, vol. 8, May-Jun. 1964, p. 76. 5 refs. In Russian.

Various factors were tested, which could affect thermostability in albino mice placed in an immobilized position in a thermal chamber, in which the temperature was maintained at 38° C. The effects of the following factors were tested: administration of chemical compounds (such as drugs, extracts from plant roots, or hormones), breathing air containing 15% CO₂, previous training to tolerate high temperatures, and induced hypoxia. These factors affect the metabolism by suppressing functions of various components of the nervous system and increase specific or nonspecific resistance of the organism to substances preventing development of thermal injury. The findings showed that various factors caused changes in thermostability

at various degrees. The general effect was found to be rather slight (0.4° to 1.7°). The strongest effect was produced by previous training. Suppression or reticular formation of the brain stem and cortisone administration were also effective.

A65-80797

"SKIN VISION" (O "KOZHNOE ZRENIIE").

S. N. Dobronravov and Ia. R. Flishelev (Sverdlovsk Pedagogical Inst., Lab. of Skin Vision, USSR).

Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 57, Aug. 1964, p. 13-16. In Russian.

In October 1962, the authors undertook an investigation of an extraordinary phenomenon in 22 year-old Roza Kuleshova, who when blindfolded was capable of discerning the color of painted surfaces, read printed matter, and recognize the characters on drawings and photographs by means of digital perception. Results of numerous investigations permitted discarding the assumption that the phenomenon could be explained by an increase in tactile and thermal sensitivity. It was due to a specific sensitivity to light stimuli of the subject's fingers, which was considered to be extraoptic vision or "skin vision".

A65-80798

RELATIONSHIP BETWEEN THE OPTIC AND SKIN PERCEPTION OF LIGHT IN MAN (K VOPROSU O RAZVITIIE VZAIMOSVIAZI GLAZNOGO I KOZHNOGO SVETOVOSPRIIATIIA U CHELOVEKA).

P. G. Sniakin (USSR, Acad. of Med. Sci., Inst. of Normal and Pathol. Physiol., Moscow).

Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 57, Aug. 1964, p. 16-20. 5 refs. In Russian.

The investigation by Soviet scientists of the photosensitivity of the skin of a subject named Roza Kuleshova able to distinguish colors, read print, etc. when blindfolded, may give basis to assume that skin nerve endings may be affected by chemical changes caused by light, which form a picture composited from a great number of impressions and correlated with a visual image. This hypothesis may be substantiated by the following facts: (1) in the dark or at insufficient illumination, the subject lost the capacity of color-value differentiation; (2) strong illumination suppressed the contrast of color or intensity of image; (3) intensive washing of the hands with soap and hot water led to a decrease in skin sensitivity, evidently due to a removal of carotinoids from the corneum layer of the epidermis. The below normal visual perception noted in the subject may be a cause or a result of competitive action of the two sensory systems.

A65-80799

CHANGES IN PULMONARY VOLUME AND VENTILATION IN HEALTHY AND SICK INDIVIDUALS DURING HYPOXIA (OB IZMENENIIAKH LEG- OCHNYKH OB'EMOV I VENTILIATSII LEGKIKH U ZDOROVOGO I BOL' NOGO CHELOVEKA V USLOVIYAKH GIPOKSII).

V. N. Alifanov (USSR Civil Air Fleet, Central Clin. Hosp., Moscow).

Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 57, Aug. 1964, p. 45-47. 10 refs. In Russian.

A study was made of 203 persons in a pressure chamber under conditions peculiar to "ascents" to 5000 m elevations, with an 11% O₂-nitrogen mixture provided for inhalation. Only moderate changes in respiration rate, vital capacity of the lungs, and reserve inspiration and expiration volumes were noted in cases with good hypoxia tolerance. Respiratory volume, inspiration capacity, and pulmonary ventilation were increased. No significant changes in pulmonary ventilation were observed in persons with pathologic conditions of the cardiovascular system, thus pointing to an inadequacy of adaptive reaction of the body. When the state of persons under examination was aggravated, there was a decrease in respiration rate frequency attended by inspiratory inhibition, a marked drop in the reserve expiration volume, and a reduction in pulmonary ventilation.

A65-80800

PROPHYLACTIC EFFECT OF AEROIONIZATION IN ACUTE RADIATION SICKNESS (O PROFILAKTICHESKOM DEISTVII AEROIONIZATSII PRI OSTROI LUCHEVOI BOLEZNI).

L. V. Serova and M. I. Fedotova.

Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 57, Aug. 1964, p. 60-63. 8 refs. In Russian.

Prophylactic effects of positive and negative aeroionization may be employed for the prevention of radiation injury in lethal gamma-irradiation of animals. The difference in the positive and negative ion action proved to be only quantitative; as compared to the negative a shorter aeroionization was required.

A65-80801

SENSITIVITY OF RABBIT'S CENTRAL NERVOUS SYSTEM TO CONTINUOUS ULTRAHIGH-FREQUENCY ELECTROMAGNETIC FIELD (O CHUVSTVITEL'NOSTI TSENTRAL'NOI NERVNOI SISTEMY KRO- LIKOV K NEPRERYVNOMU ELEKTROMAGNITNOMU POLIU SVER- KHVYSOKIKH CHASTOT).

Z. M. Gvozdkova, V. M. Anan'ev, I. N. Zenina, and V. I. Zak.
Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 57, Aug. 1964, p. 63-68, 18 refs. In Russian.

Unilateral 5-minute irradiation of rabbits with ultrahigh-frequency electromagnetic fields caused various electroencephalogram (EEG) changes in the majority of the animals. A graphic relationship was noted between the average latent period of EEG reactions of the bradycardia type and the flux density for the electromagnetic waves, 100 and 52 cm in length. The greatest sensitivity was manifested by the central nervous system of the rabbits to the fields with the wave length of 100 cm, a somewhat lower one to the fields with a wave length of 52 cm, and the least to the fields with a wave length of 12.5 cm.

A65-80802

PROPAGATION THROUGH THE SKULL BONES OF ULTRASONIC VIBRATIONS EVOKING ACOUSTIC RESPONSE TO PROVEDENII ULTRAZVUKOVYKH KOLEBANI, VYZYVAIUSHCHIKH SLUKHOVYE OSHCHUSHCHENIYA, CHEREZ KOSTI CHEREPAI.

B. M. Sagalovich and G. G. Melkumova.

Biophysika, vol. 9, 1964, p. 477-483. In Russian.

Ultrasonic vibrations with frequencies audible to humans, when applied directly to various areas of the skull, were radiated through the skull bones from the locus of application at different velocity and intensity, depending upon the thickness of the sutures and the cancellous structure of the bones. In these areas the vibration intensity was lowered.

A65-80803

ESTIMATION OF THE PRODUCTIVITY OF CHLORELLA STRAINS IN LIQUID CULTURE. OTSENKA PRODUKTIVNOSTI SHTAMMOV KHLORRELLY V ZHIDKOI KULTUREI.

E. N. Vaulina and I. D. Anikeeva (USSR, Acad. of Sci., Inst. of Biol. Phys., Moscow).

Biophysika, vol. 9, 1964, p. 393-394. In Russian.

The exponential law of *Chlorella* growth under optimal conditions permits computation of the number of cells at a given time. This number is directly proportional to the number of cells in the initial culture and an exponential function of the time and growth coefficient, which is specific for each strain. The formula was found to be valid for a 48-hr culture and can be used for a comparative study of optimal growth.

A65-80804

ROD-CONE INDEPENDENCE IN THE AFTER-FLASH EFFECT.

M. Alpern (Mich. U., Ann Arbor).

Journal of Physiology, vol. 176, Feb. 1965, p. 462-472, 10 refs.

The study of rod-cone independence in the afterflash effect revealed that the threshold for a 5 msec flash can be greatly raised by following it (50 msec later) by a 5 msec afterflash applied to the surrounding field. When the test-flash excites only rods, afterflashes of various wavelengths, but of fixed scotopic brightness, all raise the test threshold equally. Therefore, it is only excitation of rods by the afterflash that raises the rod threshold to the test flash. During the period of dark adaptation, when the cones have fully recovered but the rod threshold still lies above them, a similar effect of the afterflash in raising the test threshold may be seen. Because in this case neither flash falls upon the active rod mechanism, the phenomenon demonstrates that cones affect cones as much as rods affect rods. This conclusion is confirmed by experiments in which the test flash enters through the center, and the afterflash through either the center or the edge, of the widely dilated pupil (Stiles-Crawford effect). There was no interaction between rods and cones.

A65-80805

THE SPECIFICITY OF THE CONE INTERACTION IN THE AFTER-FLASH EFFECT.

M. Alpern and W. A. H. Rushton (Mich. U., Ann Arbor; and Physiol. Lab., Cambridge, Mass.)

Journal of Physiology, vol. 176, Feb. 1965, p. 473-482, 7 refs.

Grants NSF G-10045; NIH NB-03014-04

The threshold for a foveal fixated 10^5 test flash can be appreciably elevated by exposing to the surrounding field a brief flash 50 msec later. The size of the effect depends upon the intensity and dominant wavelength of the afterflash and the dominant wavelength of the test flash. Each of the Stiles cone mechanisms acts independently in those afterflash experiments. If the test flash at threshold excites π_5 , then the afterflash raises this threshold only by stimulating π_5 in the surrounding field. The extent to which π_4 and π_1 are also stimulated is quite irrelevant. Similarly, if the test excites π_4 or π_1 , at threshold, the afterflash effectiveness depends solely upon the stimulation of π_4 or π_1 , in the surrounding field.

A65-80806

THE OCULOMOTOR RESPONSE TO SMALL TARGET REPLACEMENTS.

H. C. Benner-Clark (Reading U., and J. J. Thomson Phys. Lab., Great Britain).

Optica Acta, vol. 11, Oct. 1964, p. 301-314, 7 refs.

Grant PHS NB 01233-07.

The speed and accuracy with which a small target (from 7.5 min to 15 min) is tracked by visual axis has been investigated using an afterimage method of observing eye-movements (27 subjects). Complementary measurements (using a contact lens and mirror) were made on accuracy of fixation and time of response (two subjects). A range of tracking performance is found: at one extreme (called Type A subject) a target displacement of 7.5 min is compensated in 1 sec by a saccade. At the other extreme (which we call Type B) compensation requires up to 10 sec, and only the larger target displacements stimulate a compensating saccade. For subjects of Type B, the time required for compensation increases rapidly as the size of saccade is reduced so as to indicate a dead space within which target movements are not compensated. The size of the dead space was measured for two subjects, yielding values of 5.5 min and 9.8 min. Mechanisms that maintain the direction of the visual axis are discussed in the light of these findings.

A65-80807

INTELLIGENCE, PERCEPTUAL INTEGRATION AND THE MINOR HEMISPHERE SYNDROME.

Alick Elithorn (Inst. of Neurol., and Royal Free Hosp., London, Great Britain).

(Joint Meeting of the French Neurological Society and the Royal Society of Medicine June 5, 1964).

Neuropsychologia, vol. 2, Dec. 1964, p. 327-332, 15 refs.

A number of studies suggest that the mechanisms underlying some spatial skills are predominantly located in the right or minor hemisphere just as the mechanisms subserving speech are generally localized in the left or dominant hemispheres. This concept and the results of some previous work using route-finding tasks is briefly reviewed. A perceptual maze which might be presumed to sample a similar skill is described. The test is sensitive to cerebral damage and there is evidence that the type of deficit in performance shown by different patients is a function of the site of the brain lesion. The advantages of test procedures which are themselves subject to systematic analysis are discussed.

A65-80808

THE EVOLUTION OF ENVIRONMENTAL CHAMBER DESIGN.

I. A. Mann.

Bio/Medical Instrumentation, vol. 1, Nov. 1964, p. 21-25.

The author discusses the following aspects pertinent to the development of an environmental chamber: (1) materials used in construction, (2) air convection methods within the unit, (3) heating methods to maintain constant temperatures and avoid contamination of the atmosphere, (4) refrigeration systems allowing for a minimum of temperature variation, (5) highly sensitive fast-response temperature control mechanisms, (6) control of environment humidification, (7) lighting methods, (8) control of ionization, sound level, and barometric pressure, and (9) suitable furnishings for maximum usefulness and relaxation.

A65-80809

HIGH-ALTITUDE PULMONARY OEDEMA.

Inder Singh, C. C. Kapila, P. K. Khanna, R. B. Nanda, and B. D. P. Rao (Armed Forces Med. Serv., New Delhi, India).

Lancet, Jan. 30, 1965, p. 229-234, 36 refs.

A study of high-altitude pulmonary edema in 332 men between 18 and 56 years is presented. The vulnerable altitude was 11,000 feet. Under identical conditions the incidence in fresh inductees and reinductees was the same. Although rapid ascent without adequate acclimatization en route, exposure to cold, and physical exertion often precipitated high-altitude pulmonary edema, the condition was also seen when none of these factors could be blamed. Individual predisposition appeared to be important. It is possible that alkalosis induced by hyperventilation on exposure to high altitude, and its persistence for weeks and months, may be the basic disturbance which aggravates hypoxia both at the tissue and at the respiratory levels in susceptible people. The various mechanisms by which hypoxia may trigger pulmonary edema and treatment are discussed.

A65-80810

SYNTHESIS OF PHOSPHORUS-CONTAINING MACROMOLECULES DURING SYNCHRONOUS GROWTH OF CHLORELLA PYRENOIDOSA.

E. C. Herrmann and R. R. Schmidt (Va. Polytechnic Inst., Dept. of Biochem. and Nutrition, Blacksburg).

Biochimica et Biophysica Acta, vol. 95, Jan. 11, 1965, p. 63-75, 46 refs.

Methods for the extraction and quantitation of ribonucleic acid phosphate and deoxyribonucleic acid phosphate in *Chlorella pyrenoidosa* (Strain 7-11-05) were developed. The levels of ribonucleic acid, deoxyribonucleic acid, and acid-insoluble inorganic polyphosphate (poly-P₁) were measured during two consecutive synchronous growth cycles in continuous light after the cells had been synchronized by intermittent illumination. An inverse relationship was observed between the levels (per cent of total cellular phosphate) to total nucleic acid phosphate and poly-P₁. However, when the concentrations of these phosphate polymers were expressed on a per-cell basis, the nucleic

acids increased nearly exponentially while poly-P₁ increased only linearly. Thus, it appeared that poly-P₁ was not serving as a phosphorylating agent during normal growth. The apparent paradox between the two methods of expressing the intracellular distribution of phosphorus as well as the probable role of poly-P₁ in cellular metabolism is discussed. The apparent differential rates of synthesis of ribonucleic acid and deoxyribonucleic acid, throughout most of cellular development, is discussed in relationship to the probable site of control of deoxyribonucleic acid synthesis in cellular metabolism. In addition, the apparent constant rate of synthesis of poly-P₁ is discussed in relationship to the synthesis and activity of polyphosphate kinase during synchronous growth.

A65-80811

PHOTOSYNTHESIS IN CELL DEVELOPMENT.

Constantine Sorokin (Md. U., Dept. of Botany, College Park).

Biochimica et Biophysica Acta, vol. 94, Jan. 25, 1965, p. 42-52. 30 refs. NASA supported research.

Nonsynchronized suspensions of the green, high-temperature alga *Chlorella* 7-11-05 were subjected to fractional centrifugation, and two size groups of cells were separated. The small-cell fraction was presumed to consist predominantly of younger cells and the large-cell fraction predominantly of older cells. Manometric measurements in phosphate buffer at pH 4.5, in bicarbonate buffer at neutral pH, and in carbonate-bicarbonate buffer at pH 9.3 indicated that younger cells invariably possessed higher photosynthetic activity than older cells, provided the separation of cells into size fractions was reasonably good and the large cells were prevented from dividing during the process of separation. The superior activity of younger cells was ascertained at various light intensities and at different temperatures. Previous observations on the decline in photosynthetic activity with the age of synchronized cells were thus substantiated in the absence of a synchronizing agent, and the decline in photosynthetic capacity must be assumed to be characteristic of normal cell development. The decline in metabolic activity in the course of cell development is discussed in connection with metabolic turnover and is viewed as a demonstration of aging of cells.

A65-80812

ENZYMATIC ACTIVITY OF THE SUCCINOXYDASE SYSTEM IN MITOCHONDRIA FROM NEURONS OF THE AUDITORY AND VISUAL CORTEX AND CEREBELLUM UNDER CONDITIONS OF RELATIVE REST AND ADEQUATE STIMULATION (AKTIVNOST' FERNENTOV S KITSINOK SIDA-ZNOI SISTEMY V MITOKHONDRIAKH NEVRONOV SLUKHOVOI I ZRITEL'NOI KORY I MOZZHECHKA V USLOVIYAKH OTNOSITEL'NOGO POKOIA I ADEKVATNOGO STIMULIROVANIYA).

Ia. A. Vinnikov, I. L. Zhinkin, and S. A. Shchukoliukov (USSR, Acad. of Sci., I. M. Sechenova Inst. of Evolutionary Physiol., Leningrad). *Fiziologicheskii Zhurnal SSR*, vol. 50, Nov. 1964, p. 1329-1334. 24 refs. In Russian.

Guinea pigs were subjected to either auditory or visual stimulation. Sections of the auditory and visual centers of the cerebral cortex were analyzed for succinic oxydase content. The findings indicate that the function of cells depends on the energetic processes in the mitochondria. The processes based on electron transfer, the oxygenative phosphorylation, and the Krebs cycle of the mitochondria in all neurons of the cerebellum were found to be different from those in the cortex neurons. Stimulation of the cortex did not affect cerebellum function. The high succinic oxydase activity in the Purkinje cells and in the neurons of the serrated nucleus indicate specific cerebellum function. This difference may be due to the difference in the mitochondria neuron structure of cortex and cerebellum.

A65-80813

THE ROLE OF MAN IN THE EXPLORATION OF SPACE.

Siegfried J. Gerathewohl (NASA, Washington, D.C.).

Bioscience, vol. 15, Mar. 1965, p. 177-180.

Man is an invaluable, necessary, and irreplaceable element in the scientific exploration of space. On an ascending scale of ability, man can act as a sensor, investigator, and evaluator of the phenomena encountered in the space environment, or he can manipulate the various systems operating therein. Astronauts, astronaut scientists, and scientists on the ground participate in NASA's flight program, which reaches from earth-based laboratories to orbiting spacecraft, landings on the moon, and planetary missions.

A65-80814

THE EFFECT OF INCREASING AGE ON THE DISTRIBUTION OF PERIPHERAL BLOOD FLOW IN MAN.

A. Douglas Bender (Smith Kline and French Labs., Res. and Develop. Div., Philadelphia, Pa.)

Journal of the American Geriatrics Society, vol. 13, Mar. 1965, p. 192-198. 46 refs.

The decline in systemic, liver, and kidney blood flows exceeds the decrease in metabolic rate of the organ(s) involved and the reduction in organ weight and number of active cells. These conclusions are based on data reported by a number of investigators in a number of different subject populations. In order to describe the changes in flow distribution with aging more

adequately, specific studies must be carried out in which regional blood flow is measured in relation to the total peripheral circulation.

A65-80815

SUN-COMPASS ORIENTATION BY PARROT FISHES.

Howard E. Winn, Michael Salmon, and Nicholas Roberts (Md. U., Dept. of Zool., College Park).

Zeitschrift für Tierpsychologie, vol. 21, Dec. 1964, p. 798-812. 10 refs. ONR supported research.

Grant PHS NB-03241.

Adult rainbow and purple parrot fish (*Scarus quacamaia* and *S. coelestius*) on the south shore of Bermuda live in offshore caves at night. During the day they feed along the shoreline. These fish, caught over the feeding grounds, when released in areas apparently unfamiliar to them, move in a southeasterly direction (90° to 180° of north) regardless of underwater topographic or hydrographic features. This is the direction from their feeding grounds to their offshore caves. Circling, stopping, and a lack of definite direction characterized the courses of fish released with cloud cover, at night, and with opaque eyecups. When a cumulus cloud partially obliterated the sun, fish swimming in a southeasterly direction started to circle and/or stopped. After the cloud had passed by, the fish again swam in a southeasterly direction. Individuals with their daily light cycle slowed by six hours swam about 190° (or counterclockwise 170°) from the southeast direction. It was concluded that the fish responded to actual rate of change of the azimuth (expected 165° shift clockwise) and not to a constant 15° per hour change (expected 90° shift).

A65-80816

OBSERVATIONS ON CEREBRAL CARBOHYDRATE METABOLISM IN MAN.

Peritz Scheinbert (Miami U. School of Med., Dept. of Neurol., Fla.)

Annals of Internal Medicine, vol. 62, Feb. 1965, p. 367-371. 22 refs. Grant NIH HE 06641-03.

The complexities of cerebral carbohydrate metabolism are reviewed in an effort to relate them to human *in vitro* studies. Existing data reveal that metabolism of carbohydrate by the brain not only provides the primary source of energy for cellular function in carrying on the normal activities of the nervous system, but in addition, furnishes energy and carbons for synthesis and maintenance of cerebral lipids and proteins, maintains optimal pH for cellular function, and plays an important role in regulating cerebral vascular tone.

A65-80817

A BIO-PHYSICAL LAW DESCRIBING HEARING LOSS.

Edward R. Hermann (Northwestern U., Evanston, Ill.)

(International Congress on Occupational Health, XIV, Madrid, Spain, September 1963).

Industrial Medicine and Surgery, vol. 34, Mar. 1965, p. 223-228. 5 refs. Grant PHS PHT 2-21A.

A mathematical formulation of the fundamental manner in which human hearing deteriorates with continuation of excessive noise exposure is presented. A general law is stated: "The rate at which noise-induced hearing loss is experienced is proportional to the amount of hearing remaining to be lost." This law is well supported by audiometric data obtained from pure tone threshold responses at 4000 cycles per second. The conclusion that the detrimental effect of noise on human hearing follows a first-order, first-degree differential equation has broad implications. A biophysical explanation of how hearing losses occur is suggested. The study indicates areas of research in the fields of anatomy, audiometry, physiology, and statistics that should prove fruitful in understanding the mechanism(s) of noise-induced hearing loss.

A65-80818

GLUCOSE PERMEABILITY OF HUMAN ERYTHROCYTES AND THE EFFECTS OF INHALATION ANESTHETICS, OXYGEN, AND CARBON DIOXIDE.

Nicholas M. Greene (Yale U. School of Med., Div. of Anesthesiol., New Haven, Conn.)

Yale Journal of Biology and Medicine, vol. 37, Feb. 1965, p. 319-330. 35 refs.

Josiah Macy, Jr., Found. supported research.

Grant PHS HE-03359.

The permeability of normal human erythrocytes to glucose was evaluated *in vitro* by measuring changes in red cell volume following exposure of red cells to hypotonic glucose solutions. Glucose permeability was independent of oxygen concentration but was increased by carbon dioxide. None of the five inhalation anesthetics studied (ether, cyclopropane, nitrous oxide, halothane, and methoxyflurane) had a significant effect on glucose permeability when employed in therapeutic concentrations.

A65-80819

TACHYPNEA AND HYPERPNEA: SIGNS OF COMPENSATORY VENTILATION.

Kaye H. Kilburn (Duke U. Med. Center, Dept. of Med.; and V. A. Hosp., Durham, N.C.)

Annals of Internal Medicine, vol. 62, Mar. 1965, p. 486-498. 15 refs. Grant PHS HE-07868.

Resting tachypnea or hyperpnea was studied in 11 patients. A history of exertional dyspnea was frequent. The hydrogen ion concentration of the arterial blood was normal, and the arterial blood carbon dioxide tension and bicarbonate concentration showed moderate reductions. Expiratory flow rates were slightly reduced and improved after nebulized isoproterenol. Decreased alveolar to expired ventilation ratio, increased ventilatory equivalent for oxygen, and reduced diffusing capacity for carbon monoxide during steady state exercise demonstrated inefficient ventilation. It is suggested that patients with tachypnea or hyperpnea should be questioned closely for dyspnea, and their pulmonary response to exercise should be tested to characterize and quantitate their limitations of function. Possible pathophysiological mechanisms include maldistribution of ventilation associated with pulmonary departitioning in critical areas and loss of distal pulmonary vessels, especially alveolar capillaries. Both could produce ventilation-perfusion inequalities in the lungs as the integrity of the distal air spaces is lost.

A65-80820

CLINICAL, ANATOMO-PATHOLOGICAL, AND CHEMO-TOXICOLOGICAL OBSERVATIONS AT THE OCCASION OF FIVE CASES OF ACUTE POISONING WITH ETHYLENE GLYCOL ANTIFREEZE (KLINICKA, ANATOMOPATOLOŠKA I HEMIJSKO-TOKSIKOŠKA ZAPAZANJA POVOĐOM PET SLUCAJEVA AKUTNOG TROVANJA ETILENGLIKOLOM ANTIFRIZOM).

Vojislav Čosić, Olga Jelačić, Mirko Kramer, and Dušan Milenković (Mil.-Med. Acad., Belgrade; and Belgrade U., Med. Coll., Yugoslavia). *Vojnosanitetski Pregled*, vol. 21, Dec. 1964, p. 775-781. 25 refs. In Serbo-Croatian.

Five cases of poisoning with ethylene glycol (antifreeze) are reported, four of which terminated in death. The antifreeze had been ingested orally, up to 500 cc, on the assumption that it was ethyl alcohol. The first clinical manifestations were observed in the lung and were followed by acute renal tubular necrosis. In the patients who had died 24 to 36 hours after ingestion of ethylene glycol, the highest concentrations of the poison were found in the intestine, lungs, liver, and brain; one patient who had died 100 hours after ingestion had the highest concentrations in the urine and kidneys. The one patient who survived recovered completely from the effects of the poisoning.

A65-80821

MAXIMAL DIFFUSING CAPACITY OF THE LUNG FOR CARBON MONOXIDE.

Robert L. Johnson, Jr., Harold F. Taylor, and W. Harold Lawson, Jr. (Tex. U. Southwestern Med. School, Dept. of Internal Med., Cardiopulmonary Div., Dallas).

Journal of Clinical Investigation, vol. 44, Mar. 1965, p. 349-355. 21 refs. Grants PHS HE 07744; PHS HE 06296.

Pulmonary capillary blood flow and apparent CO diffusing capacity (DL_{CO}) were measured by a breath-holding technique both at rest and during exercise and repeated at two different alveolar oxygen tensions so that the true membrane diffusing capacity (DM_{CO}) and pulmonary capillary blood volume (Vc) could be determined by the Roughton-Forster method. DL_{CO} kept rising as workload was increased until the pulmonary blood flow and oxygen consumption stopped going up. DL_{CO} increased principally because of a twofold increase in Vc during exercise. DM_{CO} increased only about 20% above the resting value. In the three patients with mitral stenosis pushed up to their peak workloads, Vc rose to the same level as in normal subjects during exercise but did not exceed the normal upper limit. This suggests that maximal distensibility of the capillary bed in normal subjects is reached or closely approached at peak workloads.

A65-80822

PARKINSONISM DUE TO CARBON-MONOXIDE POISONING.

Harcharan Singh and R. C. Sarin (Med. Coll., Amritsar, India). *Indian Journal of Anaesthesia*, vol. 12, Nov. 1964, p. 344-349. 17 refs.

A case of carbon-monoxide poisoning is described in detail. The patient was admitted in a state of unconsciousness with pulmonary edema. On regaining consciousness it was discovered that he was suffering from visual agnosia. A few days later he developed Parkinsonism. Visual agnosia regressed with time, and Parkinsonism symptoms were relieved by Ethopropazine.

A65-80823

THE RESPONSE OF EXTRACELLULAR HYDROGEN ION CONCENTRATION TO GRADED DEGREES OF CHRONIC HYPERCAPNIA: THE PHYSIOLOGIC LIMITS OF THE DEFENSE OF pH.

William B. Schwartz, Newton C. Brackett, Jr., and Jordan J. Cohen (Tufts U. School of Med., Dept. of Med., Medford, Mass.; and Pratt Clin.-New England Center Hosp., Renal Lab., Boston, Mass.)

Journal of Clinical Investigation, vol. 44, Feb. 1965, p. 291-301. 7 refs. Life Insurance Med. Res. Fund supported research. Grants NIH H-759 and NIH HTS-5309.

Studies were carried out in ten normal dogs attempting to characterize the response of acid-base equilibrium to chronic, stepwise increases in arterial carbon dioxide tension (P_{CO_2}). At each concentration of carbon dioxide (7%, 11%, and 17%) the animals were exposed for a period of at least 5 days to allow extracellular composition to reach a new steady state. The data demonstrate that every increment of P_{CO_2} induced a rise in renal acid excretion and a marked rise in plasma bicarbonate concentration, but at no level of carbon dioxide tensions was the pH of the extracellular fluid restored to normal. A notable finding was the strikingly linear relationship between hydrogen ion concentration and P_{CO_2} .

A65-80824

CONTRIBUTION TO THE STUDY OF THE RADIOPROTECTIVE PROPERTIES OF 2-MERCAPTOBENZOTHAZOL (CONTRIBUCION AL ESTUDIO DE LAS PROPIEDADES RADIOPROTECTORAS DEL 2-MERCAPTOBENZOTIAZOL). M. C. López Zumel, Y. Bernard, and R. Rinaldi (Superior Council of Scient. Invest., Inst. of Chem. and Phys., Madrid, Spain).

Revista Española de Fisiología, vol. 20, Sep. 1964, p. 121-127. 10 refs. In Spanish.

The radioprotective property of 2-mercaptobenzothiazole (MBT) was investigated with respect to its (a) distribution in tissues and hypothermic effect in mice, and (b) action in a bilirubin solution. The animals and the bilirubin solution were exposed to X-ray irradiation of varying intensities. A survival of 70% of the animals studied was observed. However, MBT was found to be inactive in vitro. MBT was also found to diffuse rapidly, to be eliminated completely within 24 hours, and to cause hypothermia within 50 minutes following injection.

A65-80825

TRANSMISSION OF INFORMATION BY EXTRATERRESTRIAL CIVILIZATIONS (PEREDACHA INFORMATSII VNEZEMNYMI TSIVILIZATSIIAMI).

N. S. Kardashev.

Astronomicheskii Zhurnal, vol. 41, Mar.-Apr. 1964, p. 282-287. 12 refs. In Russian.

One-way cosmic transmission is conditioned by the long duration of propagation of signals. Isotropic radiation is necessary for a possible and reliable reception by an unknown population. Computations are made of the optimal spectrum of the signal which provides for a maximal amount of information in the presence of quantum fluctuations and cosmic radio emission background. It is shown that a civilization at any distance in the Universe, which can transform power of the order of $L_{\odot} \sim 4 \cdot 10^{33}$ ergs/sec, and higher into an isotropic coded radio signal, can be detected by present-day radio astronomical methods. The expected specific properties of artificial sources of cosmic radio emission are noted. It is even possible that some of the known sources (e.g., CTA-21 and CTA-102) are artificial.

A65-80826

BREATHING OF PRESSURE OXYGENATED SALT SOLUTIONS.

Johannes A. Kijstra (Leiden U., Dept. of Physiol., Appl. Physiol. Div., The Netherlands).

(American College of Chest Physicians, 30th Annual Meeting, San Francisco, Jun. 18-22, 1964).

Diseases of the Chest, vol. 47, Feb. 1965, p. 157-159. 8 refs.

Aquatic respiration was studied in dogs in a pressure chamber large enough to accommodate the air-breathing investigator together with the liquid-breathing experimental subject. The animal utilized oxygen dissolved in saline solution by bubbling the gas under pressure. One dog survived the experience with no apparent harmful effects. The animal's blood pressure was slightly diminished but stable during breathing the normal saline equilibrated with oxygen at 5 atmospheres and 32° C. Moderate bradycardia was noted, but the rate was regular. Arterial blood oxygen tension was normal, but the CO_2 content increased by 8 volume percent after 20 min. The animal was resuscitated after 24 min of submersion. The difference between air and liquid breathing is in the carrier medium; in air breathing, nitrogen serves as a carrier, while in liquid breathing the gas exchange proceeds through water, which has different physical properties and is not affected by pressure changes.

A65-80827

REDUCTION OF RADIATION DAMAGE TO THE INTESTINAL MUCOUS MEMBRANE BY LOCAL HYPOXIA.

B. Larsson and S. Sténson (Uppsala U., Gustaf Werner Inst.; and Umeå U., Inst. of Pathol., Sweden).

Nature, vol. 205, Jan. 23, 1965, p. 364-365. 10 refs. Swedish Atomic Res. Council, and Swedish Cancer Society supported research.

The possibility of reducing acute radiation damage to the rectal mucous membrane by creating a state of local hypoxia in this region during irradiation was studied. Female albino rats of the Wistar strain were used as subjects. Before irradiation (protons and gamma rays) a thin rubber catheter, perforated

1 cm from its closed tip, was introduced about 5 cm into the rectum of the anesthetized rat via the anus. The catheter was fixed about 0.5 cm from its end through a silk suture carefully applied around the rectum. Another small suture was used to mark the position of the temporary rectal stenosis provided. Treatment aiming at the removal of oxygen from the mucous membrane between the anus and the sutures was started 5 min before irradiation by injection of 1 ml concentrated norepinephrine through the catheter. One min later, continuous rectal injection of a reducing solution (0.1 M sodium sulfite in tap water) was started and continued until the end of irradiation. In 82% of the cases changes in the deoxygenated intestinal segments were one or two grades less than in those of the normally oxygenated segments. In 18% there was no clear difference between the two segments. In no case were the changes of the deoxygenated segments more marked than in the normally oxygenated ones. The results suggest that the protective effect of local application of norepinephrine and sodium sulfite demonstrated in the early interval after irradiation may be due to the hypoxic state of the tissue during irradiation.

A65-80828

EFFECTS OF DIESEL EXHAUST.

Mario C. Battigelli (Pittsburgh U., Graduate School of Public Health, Dept. of Occupational Health, Pa.)
(Seventh Annual Air Pollution Medical Research Conference, Los Angeles, Feb. 10-11, 1964).

Archives of Environmental Health, vol. 10, Feb. 1965, p. 165-167.
Grant PHS AP0033-01.

Volunteers were exposed to diesel exhaust gas alternately through inhalation, and by conjunctival exposure. Dilutions explored were geared to encompass the worst level found in diesel shops. When using eye exposure the subject was questioned for the earliest positive detection of the gases, and the lapse of time from the beginning of exposure was called onset time. For the inhalation exposure measurements were made of pulmonary resistance. Inhalation of each of the three levels so far employed did not produce any change significant in terms of pulmonary resistance. More remarkable was the lack of complaint by the subjects exposed to mouth inhalation with the exception of a transitory, unpleasant taste, which disappeared after exposure was terminated. Conversely, the same concentrations experienced on the eye setup were all sooner or later objectionable to the point that several subjects abandoned it. A discrepancy was noted between subjects' responses to inhalation and eye exposure in the direction of a greater sensitivity of the conjunctivae.

A65-80829

VOLUNTARY REGULATION OF THE GALVANIC SKIN RESPONSE [PROIZOL'NAIA REGULIATSIIA KOZHNO-GAL'VANICHESKOGO REFLEKSA]. P. V. Simonov, M. N. Valueva, and P. M. Ershov (USSR, Acad. of Sci., Inst. of Higher Nervous Activity and Neurophysiol., Moscow).

Voprosy Psikhologii, vol. 6, Nov.-Dec. 1964, p. 45-50. 7 refs. In Russian.
Experiments conducted on human subjects disclosed the fact that mental interpretation of a verbal command, by formation of a mental image based on previous experiences, may produce a definite skin galvanic response the tracing of which may be interpreted like a "Morse Code".

A65-80830

CONTROL OF MOVEMENTS BY SPINAL CORD [K VOPROSU O SPINAL'NOI REGULIATSII DVIZHENII].

I. I. Piatetskii-Shapiro and M. L. Shikh (USSR, Acad. of Sci., Inst. of Biol. Phys., Moscow).

Biofizika, vol. 9, 1964, p. 488-492. 19 refs. In Russian.

According to an analysis of the systems regulating body movements, the assumption that body movements are under control of the spinal cord alone cannot be accepted in the light of present day knowledge of motor-unit action.

A65-80831

MOTOR PROBLEM MODEL [OB ODNOI MODEL'NOI DVIKATEL'NOI ZADACHE].

V. I. Krinski and M. L. Shikh (USSR, Acad. of Sci., Inst. of Biol. Phys., Moscow).

Biofizika, vol. 9, 1964, p. 607-611. In Russian.

A mathematical analysis is presented of combined shoulder and elbow joint motions, in which the overall motion function approaches zero. It was found that adjustment to the minimal point required only a few seconds. It could be accomplished either by simultaneous or consecutive movements of elbow and shoulder. Time measurements and motion trajectory (as traced on a luminous screen) to the point of minimum value of the function were less for simultaneous than for consecutive motions.

A65-80832

STUDIES ON THE BEHAVIOR OF SINGLE FUNCTIONAL POTENTIALS IN STRIATED MUSCLE UNDER CONDITIONS OF OVERHEATING OF THE ANIMAL BODY [BADANIA NAD ZACHOWANIEM SIE POJEDYN-CZEGO POTENCJALU CZYNNOSCOWEGO MIESNIA PRAZKOWANEGO W WARUNKACH PRZEGRZANIA USTROJU ZWIERZECEGO].

Zbigniew Edelwejn (Mil. Inst. of Aviation Med., Warsaw, Poland).
Acta Physiologica Polonica, vol. 15, Sep.-Oct. 1964, p. 663-667. In Polish.

Certain single or polyphasic potentials in the striated muscles of rabbits were studied within the intramuscular temperature range of 38° to 43.5°C. An increase in intramuscular temperature did not affect the single potentials but shortened polyphasic potential duration.

A65-80833

HEAVY MUSCULAR EXERCISE DURING INTRAVENOUS FEEDING WITH GLUCOSE AT VARIOUS SPEEDS [CIEZKA PRACA MIESNIOWA POD-CZAS DOZYLNEGO KARMIENTA GLIKOZA Z ROZMAITA PREDKOSCIA]. Mieczyslaw Wieruchowski (Polish Acad. of Sci., Dept. of Physiol., Lodz).
Acta Physiologica Polonica, vol. 15, Nov.-Dec. 1964, p. 729-758. 32 refs. In Polish.

Comparative studies of the blood sugar level during rest on heavy physical exercise, with or without intravenous glucose administration, were conducted on dogs. In order to maintain the same blood sugar level during exercise as during rest, the rate of glucose administration during exercise must be increased. However, the mechanism of glucose utilization, storage, and excretion is the same in both phases.

A65-80834

HISTOCHEMICAL STUDIES ON THE CONTENT OF ADRENALINE AND NORADRENALINE IN THE ADRENAL GLANDS OF TRAINED RATS [HISTOCHEMICZNE BADANIA ADRENALINY I NORADRENALINY W NADNER-CZACH SZCZUROW TRENOWANYCH]. Leokadia Lubanska-Tomaszewska (Polish Acad. of Sci., Dept. of Physiol., Warsaw, Poland).

Acta Physiologica Polonica, vol. 15, Nov.-Dec. 1964, p. 831-838. 8 refs. In Polish.

In rats which had undergone training, a histological examination of the adrenal glands disclosed focal thickening and fibrosis of the capsule. Atrophy of the glomerular layer and obliteration of its structural outline were observed. The cells of the glomerular layer contained a transudate. In the zona fasciculata, foci of degenerated cells were found, which lacked lipid content in the cytoplasm. The fissure separating the medulla from the outer portion showed protein containing transudates. The lymphatic vessels of the cortex were dilated and filled with protein containing fluid. Hyperemia, particularly in the medulla, was noted. Adrenaline and noradrenaline content was decreased.

A65-80835

INCORPORATION OF Fe^{59} IN HUMAN BONE MARROW CELLS IN VITRO UNDER CONDITIONS OF ALTITUDE HYPOXIA [INKORPORACJA Fe^{59} DO KOMOREK SZPIKU LUDZKIEGO IN VITRO W WARUNKACH NIEDOTLENIEŃ WYSOKOSCOWYCH].

Andrzej Polubiec (Acad. of Med., Dept. of Hematol., SDL, Warsaw; and Hematol. Inst., Hematol. Clin., Warsaw, Poland).

Acta Physiologica Polonica, vol. 15, Nov.-Dec. 1964, p. 805-817. 24 refs. In Polish.

Human bone marrow cells were incubated in a small low pressure chamber in the presence of Fe^{59} . Controls were incubated at normal atmospheric pressure. The results indicate that, in vitro, high-altitude hypoxia induces an increase in labelled iron incorporation in the bone marrow cells by about 58%.

A65-80836

CONTENT OF RIBONUCLEIC ACIDS IN ORGANS WITH DIFFERENT PROTEIN METABOLISM UNDER THE INFLUENCE OF PHYSICAL TRAINING [WPLYW TRENINGU FIZYCZNEGO NA ZAWARTOSC KWASOW RYBONU-KLEINOWYCH W NARZADACH O ROZNYM METABOLIZMIE BIALKOWYM]. Leokadia Lubanska-Tomaszewska and Janina Janota-Lukaszewska (Polish Acad. of Sci., Dept. of Physiol., and INKF, Dept. of Physiol., Warsaw, Poland).
Acta Physiologica Polonica, vol. 15, Nov.-Dec. 1964, p. 819-829. 36 refs. In Polish.

The degree of electrophoretic serum-protein changes, which take place under physical stress affecting the state of the protein producing organs were studied in rats. The RNA content in desiccated tissues of various organs was taken as an index. The findings showed an increase in RNA content in the spleen, the thymus, the lymph nodes, the bone marrow, and the adrenal glands. In the liver, the elevation was slight, and in the cerebral cortex tissues no change was noted.

A65-80837

ON THE INFLUENCE OF ULTRAVIOLET RADIATION ON THE BLOOD SUGAR LEVEL IN RABBITS [O WPLYWIE PROMIENI ULTRAFIOLETO-WYCH NA POZIOM CUKRU WE KRWI KROLIKOW]. Eugeniusz Mierkiewski and Romuald Klinka (Acad. of Med., Dept. of Physiol., Szczecin, Poland).

Acta Physiologica Polonica, vol. 15, Nov.-Dec. 1964, p. 623-634. 25 refs. In Polish.

Single, large-dose ultraviolet irradiation of the skin in rabbits caused a slight rise in blood sugar level, with a maximum value noted 60 min after

exposure. Oral administration of glucose prevented this effect but had no influence on glucose tolerance. Repeated daily irradiation enhanced the organism's ability to maintain the blood sugar level within tolerable upper limits, but decreased sugar tolerance and moderated the hypoglycemic effect of insulin. These reactions could be due to an increase in tone of the sympathetic nervous system, or to a change in adrenal activity.

A65-80838

PREDICTING HEARING LOSS FROM NOISE-INDUCED TTS.

J. C. Nixon, A. Glorig, and D. W. Bell.

Archives of Otolaryngology, vol. 81, Mar. 1965, p. 250-256.

Grant PHS OH-0092.

The relationship between noise-induced temporary threshold shift (TTS) and noise-induced permanent threshold shift (PTS) measured during 1961 and 1962 is presented. The 1962 tests were made with the same testing equipment and in the same way as the 1961 tests except that the frequency presentation order for the 1962 tests was changed. The 1961 tests were made using the following order of presentation: 2000, 1000, 3000, and 4000 cps; the left ear was always tested first. For the 1962 test schedule, the frequency test order was 3000, 4000, 1000, and 2000 cps, and both ears were tested at each frequency before the next one was presented. Scatter diagrams of PTS versus TTS for all ears at 2000 and 4000 cps for the high and low groups indicate that the high-noise group exhibits a positive correlation between individual TTS and PTS while the low-noise group does not. Since the correlation between TTS and PTS is significant at all test frequencies for the high-noise group, and since the equation and constants for predicting hearing loss from TTS derived from this relationship appear valid, it seems logical to use TTS found in individuals who work in noisy environments as an adjunct test for determining individual hearing conservation criteria rather than relying exclusively on noise measurements, estimates of exposure time, etc.

A65-80839

VESTIBULAR RESPONSES IN MIDBRAIN, THALAMUS, AND BASAL GANGLIA.

Ernest A. Spiegel, Emory G. Szekely, and Phillip L. Gildenberg (Temple U. Med. Center, Depts. of Exptl. Neurol. and Cerebral Stereotaxic Inst., Philadelphia, Pa.)

Archives of Neurology, vol. 12, Mar. 1965, p. 258-269. 44 refs.

Grants NIH NB-4418; NIH NB-470.

Vestibular responses in the midbrain, thalamus, and basal ganglia were studied in cats by electric stimulation of the medial or lateral areas of the vestibular nuclei. Responses were obtained from the anterior ecto- and suprasylvian gyri, caudate nucleus, putamen, globus pallidus, centrum medianum, the nucleus ruber, and the magnocellular part of the medial geniculate body. Lesions of the latter cell group encroaching upon the posterior nuclear group of the thalamus, including the supragenulate nucleus, almost completely abolished the cortical and caudate reactions. Lesions of the centrum medianum diminished, or abolished the caudate response in about two thirds of the cases. Lesions of the nucleus ruber diminished only in single instances the caudate or pallidal reactions. Severance of medial longitudinal fasciculi and of Forel's tegmental fasciculi did not appreciably affect the forebrain areas response. Interruption of the superior cerebellar peduncles at their decussation did not prevent these reactions. Mesencephalic lesions caused an increase in amplitude of potentials, particularly in the caudate nucleus. The existence of a system in the dorsal part of the mesencephalic tegmentum, which inhibits certain forebrain responses to vestibular stimulation, has been suggested.

A65-80840

BIOTELEMETRY IN MEDICINE.

R. T. Allen, M. L. Hanson, and D. J. Kresge (United Aircraft Corp., Hamilton Standard Div., Bio-Sci. and Technol., Space and Life Systems Dept., Washington, D.C.)

Bio/Medical Instrumentation, vol. 1, Dec. 1964, p. 15-19.

The monitoring device discussed embodies all the principles desired in a biotelemetric system. It is a single-channel system consisting of a transmitter and detachable electrodes, to be worn by the patient, and of a small receiver, which can be placed on a table. The receiver output can be connected to an oscilloscope, recorder, cardiograph, or to any other type of a data-processing instrument. The transmitter can be affixed to the patient's skin. The energy source is a battery, which is replaceable. A collapsible loop antenna is provided. The transmitter frequency is crystal-controlled and utilizes a very narrow band. A modulation system is provided, in which the carrier is amplitude-modulated by a frequency-modulated subcarrier. The range of the system is about 40 feet in free space for noise-free operation. Frequency response is within 3 dB from 0.08 to 175 cps. The low frequency corner can be adjusted to 0.8 cps. Baseline fluctuations are minimal but can be shifted, if desired, for a shorter time constant; however, for diagnostic EKG's a longer time constant is accepted. The useful life of the silver oxide battery is three days. The receiver is all solid state and stable, but not crystal-controlled. Occasional realignment is required. Tuning is rarely necessary.

A65-80841

PHYSICAL BASES OF RELATIVE BIOLOGICAL EFFECTIVENESS OF VARIOUS TYPES OF RADIATION [PHYSIKALISCHE GRUNDLAGEN ZUR RELATIVEN BIOLOGISCHEN WIRKSAMKEIT VERSCHIEDENER STRAHLENARTEN].

Dietrich Harder (Würzburg U., Physik. Inst., West Germany).

Biophysik, vol. 1, 1964, p. 225-259. 93 refs. In German.

Biological effects are considered with respect to the dose and the type of radiation. The discussion covers concepts, calculation, and application of parameters of linear energy transfer, relative biological effectiveness, radiosensitivity, and models based on the target theory.

A65-80842

ON THE PROBLEM OF IONIZING RADIATION STRESS IN MANNED SPACE FLIGHT AS WELL AS SUPERSONIC AND HYPERSONIC COMMERCIAL FLIGHT. PART I. [ZUR FRAGE DER BELASTUNG DURCH IONISIERENDE STRAHLUNG BEIM BEMANNTEN RAUMFLUG SOWIE BEIM UBERSCHALL- UND HYPERSCHALL-VERKEHRSLUG. I. MITTEILUNG].

E. H. Graul (Marburg a. d. Lahn U., Div. for Radiobiol. and Isotope Res., West Germany).

Biophysik, vol. 1, 1964, p. 260-281. 26 refs. In German.

Ionizing radiation hazards in space are discussed in detail, including:

- (1) biophysical aspects of radiation stresses from Van Allen radiation belts and solar proton flares, (2) magnetosphere, Van Allen radiation belts, (3) biophysics of solar protons in relation to space flight, (4) considerations of supersonic and hypersonic flights and solar proton radiation, (5) radiation dose from proton showers, (6) some conclusions with respect to supersonic flight, and (7) problems of radiation protection and of forecasting large proton showers.

A65-80843

BIOLOGICAL EFFECTS OF HIGH ENERGY RADIATION ON PLANT SEEDS [BIOLOGISCHE WIRKUNGEN VON HOCHSTENERGIESTRAHLEN AN PFLANZENSAMEN].

H. Glubrecht, W. Scheuermann, and D. Widera (Hannover Tech. Coll., Inst. for Radiobiol., Hannover, West Germany).

Biophysik, vol. 1, 1964, p. 282-286. 10 refs. In German.

Biological effectiveness of high energy radiation was investigated in a series of experiments, in which seeds of barley and *Lilium regale* were irradiated with 20 GeV protons, 600 MeV protons, and, for comparison, with 150 kV X-rays. The extreme difficulty in calculation of the radiation dose is discussed. Obviously, nuclear disintegration (nuclear stars) are of particular significance in biological effectiveness. High energy radiation employed in these series was significantly more effective than X-rays at approximately equal doses.

A65-80844

RADIATION PROTECTIVE EFFECT OF ETHYL PALMITATE AND VEGETABLE OILS IN ANIMAL EXPERIMENT [STRAHLENSCHUTZWIRKUNG VON ÄTHYLPALMITAT UND VON PFLANZENÖLEN IM TIERVERSUCH].

Kurt Flemming (Freiburg im Breisgau U., Radio Biol. Inst., and Heiligenberg Inst., Biophys. Div., Baden, West Germany).

Biophysik, vol. 1, 1964, p. 339-342. 8 refs. In German.

Radiation protective effect of ethyl palmitate in mice was established (1) for doses equivalent to chemical splenectomy (100 mg intravenously), and (2) for smaller doses (25 mg) without histological damage to the spleen. In addition, ethyl palmitate had a protective effect in splenectomized as well as intact mice. Intraperitoneal injections of olive oil (doses ranging from 0.5 to 1 ml) to explore whether the protective effect is due to palmitic acids produced significant protection against X-ray irradiation with up to 24 hours between injection and irradiation. Other vegetable oils injected intraperitoneally had a similar radioprotective effect, apparently not due to their content of unsaturated fatty acids. It was shown that little of the injected oil is absorbed, therefore calorie uptake may be considered an insignificant factor. It is suggested that intraperitoneal and/or intravenous injections of ethyl palmitate and olive oil give radiation protection via their action on the reticuloendothelial system in mice.

A65-80845

PROTECTIVE EFFECT OF CYSTEINE AND AET IN RADIATION-INDUCED DOMINANT LETHAL MUTATIONS OF THE MOUSE [SCHUTZWIRKUNG VON CYSTEIN UND AET BEI STRAHLENINDUZIERTEN DOMINANTEN LETALMUTATIONEN DER MAUS].

U. Ehling (Neuherberg Inst. for Radiation Protection Res., Neuherberg, West Germany).

Biophysik, vol. 1, 1964, p. 427-428. In German.

Two hundred and thirty-four mice were administered (a) Group I—15 mg. cysteine, (b) Group II—S, 2-aminoethylisothiuroniumbromide-hydrobromide (AET), and (c) Group III—sodium chloride. Part of each group was irradiated with 600 r (300 kv, 10 mA, focal distance 55.5 cm). Controls and irradiated males were mated with nonirradiated females. The females were killed 13 1/2 to 16 1/2 days after conception and their uteri examined for implantations. Parallel series investigated the effect of pretreatment with the above drugs

on the duration of radiation-induced sterility, and 30-day survival. The mortality rate after whole-body irradiation with 900 r was 100% with NaCl pretreatment, 16% with cysteine pretreatment, and 1% with AET pretreatment. Sterility upon 600 r irradiation with NaCl pretreatment averaged 57 days. Pretreatment with cysteine and AET shortened duration of sterility by 17% and 30%, respectively. Neither of the compounds exerted a mutagenic effect. The radioprotective effect was achieved only when the intervals between pretreatment and irradiation were more than 10 minutes and less than 40 minutes. Cysteine pretreatment had no protective effect on the mutation rate while AET pretreatment exerted a statistically significant protective effect.

A65-80846

A RELATIVE MAXIMUM IN THE DECAY OF LONG-TERM DELAYED LIGHT EMISSION FROM THE PHOTOSYNTHETIC APPARATUS.

Walter F. Bertsch and J. R. Azzi (Oak Ridge Natl. Lab., Biol. Div., Oak Ridge, Tenn.)

Biochimica et Biophysica Acta, vol. 94, Jan. 25, 1965, p. 15-26. 57 refs.

The time course of long-term (0.5 to 60 sec) delayed light emission from the photosynthetic apparatus of living cells depends on wavelength and intensity of the exciting light, growth stage of the cells, and temperature. For saturating intensities of exciting light and at temperatures between 15° and 35°C, exponential phase algal cultures emit delayed light with two distinct time courses of decay: (1) after excitation of accessory pigments the decay decreases monotonically with time, and (2) after excitation of chlorophyll *a* the decay shows a relative maximum in which the emission actually increases for a short period; that is, the first derivative changes sign twice. These two decay curves cross each other. Simultaneous excitation of accessory pigments and chlorophyll *a* results in a decay which is similar to that after excitation of chlorophyll *a* alone, but displaced so as to be intermediate (except near the crossover point) between the individual decays. Temperature effects suggest the involvement of enzymes in the light emission. The observations are interpreted as evidence for coupling between enzymes and chlorophyll systems having solid state properties.

A65-80847

STATUS REPORT ON GEMINI AND APOLLO.

George E. Mueller.

Spaceflight, vol. 7, Mar. 1965, p. 47-51.

The Gemini and Apollo programs, in addition to assignments of a technical nature, incorporate tasks concerned with gaining medical information, including: (1) cardiovascular reflex experiments to develop countermeasures for deterioration of blood distribution in the body caused by weightlessness; (2) postflight analysis of urine collected on board to determine the body's reaction to stress, and hormone analysis for evaluation of cardiovascular response mechanisms; (3) X-ray analysis of certain bone structures of the hands and feet, in order to establish occurrence and degree of bone demineralization, particularly calcium loss; (4) state of alertness levels, of consciousness, and of depth of sleep; (5) vestibular effects; (6) inflight ability to perform physical exercises and their effect on blood pressure; and (7) possible hazards in landing on rugged surfaces.

A65-80848

THE PROBLEM OF ACCLIMATIZATION TO HOT-CLIMATE REGIONS. I. SOME PHYSIOLOGICAL INDICATORS IN PERSONS EXAMINED IN THE HIGH TEMPERATURE CHAMBER.

Wladyslaw Ejsmont, Bronislaw Lewalski, Jerzy Waśkiewicz, and Adam Went (Inst. of Marine Med., Gdańsk, Poland). (Congress of the Polish Physiological Society, 9th, Toruń, Dec. 10-13, 1963).

Biuletyn Instytutu Medycyny Morskiej W Gdańsku, vol. 15, 1964, p. 185-192. 12 refs.

In order to study the manner of acclimatization of man to hot-climate regions, adult males were subjected to temperatures of about 33°C for about 2 hours in a thermal chamber. The results showed the following physiological changes: (1) increase in heart rate and in pulmonary vital capacity, (2) fall in blood pressure, and (3) increase in the minute volume. Persons not adapted to high temperatures showed a higher degree of these disturbances. Younger persons showed better tolerance than men over 40.

A65-80849

THE PROBLEM OF ACCLIMATIZATION TO HOT-CLIMATE REGIONS. II. UROPEPSIN CONTENTS IN THE URINE FROM MEN STAYING IN THE CHAMBER OF HIGH TEMPERATURE.

Bronislaw Lewalski and Wladyslaw Ejsmont (Inst. of Marine Med., Gdańsk, Poland).

(Congress of the Polish Physiological Society, 9th, Toruń, Dec. 10-13, 1963).

Biuletyn Instytutu Medycyny Morskiej W Gdańsku, vol. 15, 1964, p. 193-198. 15 refs.

A group of male subjects, who professionally spent a great deal of time either in hot climate regions or as deep-sea divers, were subjected to high temperatures in a thermal chamber. A two-hour exposure caused an increase in uropepsin. Those adapted to high-temperatures tolerated the

experience better than subjects who usually worked at low ambient temperatures, and their uropepsin increase was lower. High temperatures tend to interfere with the normal physiological processes, particularly with the circulatory system in persons not used to hot ambient air.

A65-80850

STUDY OF THE SINGLE CHANNEL HYPOTHESIS AND INPUT REGULATION WITHIN A CONTINUOUS, SIMULTANEOUS TASK SITUATION.

Louis M. Herman (New York City U., Queens Coll., Dept. of Psychol., N.Y.) *Quarterly Journal of Experimental Psychology*, vol. 17, Feb. 1965, p. 37-46. 11 refs.

Subjects performed simultaneously on an auditory tracking and an auditory discrimination task, with each task presented to a separate ear. Information transmitted on the tasks was measured as a function of ability to predict task characteristics, input information-rate, and input discriminability. Based on comparison of single versus simultaneous task performance, support was found for a single, central decision-type channel in information processing, having as one primary limit the rate at which information can be accepted. Discriminability of inputs also was found to be a limit on information processing rate. Although ability to predict a task's characteristics facilitated performance on that task, in this experiment it did not result in facilitation of performance on the second task. Relevance of these findings to certain aspects of Broadbent's information processing model is discussed.

A65-80851

EXPECTANCY AND INTERMITTENCY.

R. Davis (Reading U., Dept. of Psychol., Great Britain).

Quarterly Journal of Experimental Psychology, vol. 17, Feb. 1965, p. 75-78. 20 refs. Reading U., Dept. of Sci. and Indus. Res. supported research.

When a human subject responds to the second of two closely succeeding stimuli, his reaction time to the second stimulus tends to increase sharply as the interstimulus interval decreases. Controversy has centered on the issue of whether this increase is mainly due to the effects of the first stimulus in producing some kind of block in the central analyzing systems or whether it is mainly due to the temporal uncertainty of the second signal, as determined by the distribution of interstimulus intervals used. By substituting for the first stimulus a spontaneous response on the part of the subject, and holding the distribution of interstimulus intervals constant, it is shown that the delays in responding to the succeeding signal are eliminated, even at intervals as short as 50 millisecc. This is interpreted as evidence in support of the intermittency hypothesis and as a clear indication that the increase in reaction times normally observed is not a result of the distribution of interstimulus intervals.

A65-80852

EFFECT OF IRRELEVANT INFORMATION ON A COMPLEX AUDITORY-DISCRIMINATION TASK.

William E. Montague (U.S. Navy Electron. Lab., San Diego, Calif.)

Journal of Experimental Psychology, vol. 69, Mar. 1965, p. 230-236. 14 refs.

An attempt was made to demonstrate that the detrimental effects of irrelevant information on discrimination learning are due to implicit response competition generated by task conditions. In a complex auditory-discrimination task, groups receiving different amounts of irrelevant information (1, 2, or 3 dimensions) never relevant to their task made fewer errors than groups receiving different amounts of irrelevant information which sometimes required differential responding. In addition, the errors increased with the number of irrelevant dimensions. Variation of task difficulty by manipulating the discriminability of the relevant information resulted in an enhancement of the effects of the irrelevant information. Repeated practice sessions reduced the effects of irrelevant information which was sometimes relevant at a faster rate than for the irrelevant information which was never relevant to the task.

A65-80853

SOME EFFECTS OF CONTOUR ON SIMULTANEOUS BRIGHTNESS CONTRAST.

Phyllis W. Berman and H. W. Leibowitz (Wis. U., Madison).

Journal of Experimental Psychology, vol. 69, Mar. 1965, p. 251-256. 12 refs.

Grant PHS M-1090.

Simultaneous brightness contrast was measured as a function of: (1) the orientation of a test object, shaped like a figure 8, on a half light, half black background and (2) type and width of a contour separating the figure halves on the divided background. Forty-eight adult subjects matched the brightness of the figure half on the dark background with that on the light background. Subjective contrast was significantly greater: (1) when the figure 8 was presented with its rings on backgrounds of different brightness than when each ring lay on both backgrounds, (2) when figure halves were moved apart, each into its own background, rather than when a dividing line separated the halves, and (3) as width of the contour between halves was increased. The results are discussed in terms of the contribution of the border to subjective contrast obtained with complex stimulus configurations.

A65-80854

DIFFERENTIAL VISUAL FEEDBACK OF COMPONENT MOTIONS.

John D. Gould (IBM Watson Res. Center, Yorktown Heights, N.Y.)
Journal of Experimental Psychology, vol. 69, Mar. 1965, p. 263-268. 8 refs.

New closed-circuit television techniques allowed the joint action of the subject's hand, control-instrument, and operational effects to be visually fed back singly or in combination. Eight visual feedback conditions and two levels of task precision were used. The results showed that the effects of visual feedback were determined by the component motions fed back, with the operational effects being the most important followed by control-instrument and hand-arm movements. A significant interaction between visual feedback and precision of movement occurred, where feedback of the operational component became more important as more overall precision of movement was demanded.

A65-80855

EFFECT OF EXTRANEUS STIMULATION ON THE VISUAL PERCEPTION OF VERTICALITY: A FAILURE TO REPLICATE.

Robert Fried (Educ. Testing Serv., Princeton, N.J.) and Richard G. Lathrop (Douglass Coll., New Brunswick, N.J.)
Journal of Experimental Psychology, vol. 69, Mar. 1965, p. 327-328. Educ. Testing Serv., Princeton, N.J. supported research.

This study was a partial replication of a previous study of the visual perception of the vertical. Under conditions of unilateral auditory stimulation, and with the head held firmly in place, 20 subjects adjusted a line segment until it appeared vertical. A previously reported shift in apparent vertical was not obtained. It is suggested that change in body attitude may be responsible for changes in apparent vertical under conditions of unilateral stimulation.

A65-80856

SOME RESULTS OF RADIATION MEASUREMENTS CARRIED OUT DURING 1960-1963 AT 200-400 KM.

S. N. Vernov, I. A. Savenko, P. I. Shavrin, V. E. Nesterov, N. F. Pisarenko et al.

Kosmicheskie Issledovaniia, vol. 2, Jan.-Feb. 1964, p. 136-146).
Cosmic Research, vol. 2, Jan.-Feb. 1964, p. 119-126. 13 refs. Translation.

The daily doses along different flight trajectories determined by measurements carried out on 15 Soviet satellites and spacecraft between August 1960 and June 1963, at altitudes between 175 and 405 km., were equal to 10 to 55 mrad/day, and apparently present no danger to cosmonauts, where the shielding of their ship is heavier than 3 to 5 g/cm². In April 1962 and June 1963, the intensity of cosmic rays at high latitudes, where magnetic rigidity did not exceed 5.4 BV, increased by a factor of 1.2. No intensity increase was observed in the equatorial latitudes where magnetic rigidity was greater than 5.4 BV. These facts confirm the assumption that there is a connection between excess cosmic radiation registered at altitudes of 200 to 400 km and primary cosmic rays. The lifetime of particles in the artificial radiation belt (created by a high-altitude nuclear explosion over Johnston Island) with mirror points lying at altitudes of about 350 to 700 km was found to be about 3 months. In orbits between 210 and 369 km, the dose due to the artificial radiation belt was 3 times larger than the dose due to cosmic rays and to the natural belt, for 20 days after the artificial belt was created. During 207 to 407 km orbits, the average daily intensity due to the radiation belts was 5.6 times larger than in the 209 to 301 km range. At 400 km the dose due to the radiation belts was equal to the cosmic ray dose.

A65-80857

MEASUREMENT OF THE TOTAL RADIATION DOSE ABOARD THE SOVIET SPACESHIPS "VOSTOK-5" AND "VOSTOK-6".

I. A. Savenko, N. F. Pisarenko, P. I. Shavrin, and V. E. Nesterov.
Kosmicheskie Issledovaniia, vol. 2, Jan.-Feb. 1964, p. 147-149).
Cosmic Research, vol. 2, Jan.-Feb. 1964, p. 127-128. 9 refs. Translation.

The intensity of absorbed radiation dose, registered by the instruments onboard the Soviet spacecrafts Vostok-5 and Vostok-6 increased from 7 mrad/day, as registered during the flight of the third Soviet spaceship, to 8 mrad/day. It could be attributed to an increase in intensity of primary cosmic radiation with the onset of the period of minimum solar activity. An estimate of tissue dose received by cosmonauts during the flight was taken as a basis for these values.

A65-80858

ELECTROENCEPHALOGRAPHIC CHANGES IN PERSONS ISOLATED FOR LONG PERIODS.

V. I. Miasnikov.
Kosmicheskie Issledovaniia, vol. 2, Jan.-Feb. 1964, p. 154-161).
Cosmic Research, vol. 2, Jan.-Feb. 1964, p. 133-138. 18 refs. Translation.

A long stay under isolated conditions caused definite functional changes in the cerebral cortex of persons so confined. The extent of functional changes depended on the experimental conditions, that is, on the arrangement of the daily routine. When an ordinary routine was followed, a lowering

of the amplitude of the alpha-rhythm was observed on the initial EEG curve, while frequency and distinctive features of the electrical reaction of the cortex to withdrawal of a photic stimulus were found to be unchanged. Lowering of the amplitude of the alpha-rhythm, appearance of diffuse slow waves on the EEG curve, and a static character of exaltation of the alpha-rhythm in subjects following modified daily routine suggest the development of inhibitory processes in the central nervous system.

A65-80859

CUTANEOUS NERVE ACTIVITY IN RESPONSE TO TEMPERATURE CHANGES OF THE CAT'S SKIN.

Robert Siminoff (Eastern Pa. Psychiat. Inst., Dept. of Basic Res., Philadelphia).

Experimental Neurology, vol. 11, Feb. 1965, p. 171-181. 24 refs.

Cutaneous nerve activity was recorded in response to changes in skin temperature. The presence of activity from the number of receptors which theoretically should be present in the area of skin innervated by the cutaneous nerve could be detected by the method of cross-correlation even if from small myelinated or unmyelinated fibers. No specific response in the small myelinated or unmyelinated afferents was detected in response to skin temperature changes in the range of 15° to 45° C. Activity recorded from the A, alpha-beta and A, delta-gamma groups in response to mechanical stimulation was not altered by skin temperature ranging from 15° to 45° C. With the temperature below this, the activity in both groups was markedly depressed. Above 45° C, there was some suppression of the A, alpha-beta, but more of the A, delta-gamma group's activity. Above 50° C, irreversible damage to the tissue occurred. Unmyelinated fiber activity in response to mechanical stimuli was increased above and below skin temperature deviating from room temperature. Below 7° C, the response was suppressed. Above 50° C, there is a large amount of C-fiber activity which occurs during the rapid change in skin temperature and this adapts out and C-fiber activity in response to mechanical stimuli is suppressed. The data derived from this study would support the spatial-temporal pattern of cutaneous sensibility as expounded by the "Oxford" group.

A65-80860

IMPEDANCE CHARACTERISTICS OF CORTICAL AND SUBCORTICAL STRUCTURES: EVALUATION OF REGIONAL SPECIFICITY IN HYPERCAPNEA AND HYPOTHERMIA.

W. R. Adey, R. T. Kado, and D. O. Walter (Calif. U., Brain Res. Inst. and Depts. of Anat. and Physiol., Los Angeles; and V. A. Hosps., Long Beach and Los Angeles).

Experimental Neurology, vol. 11, Feb. 1965, p. 190-216. 27 refs.
 Grants NIH MH -03708; AF AFOSR-246-63.

A modified technique permitting simultaneous examination of a quadrature, or reactive component of impedance, as well as the resistive measure on which previous studies were based was used in this study. Characteristics of the rapid spontaneous fluctuations in impedance baseline revealed by this method in such regions as the midbrain reticular formation, amygdala, and hippocampus of cats were examined. Regional differences were found in these apparently spontaneous impedance signals. Careful evaluation revealed that they may arise in part from exceedingly small (but partially coherent) amounts of energy at the impedance signal frequency of 1000 cps, and may originate in electrophysiological tissue generators, particularly in the midbrain and pontine reticular formations, and geniculate bodies. On the other hand, this impedance measuring technique had reliably revealed with great sensitivity the amount and direction of slower changes induced in the resistive and reactive components by such manipulations as transient alterations in blood carbon dioxide levels and induction of hypothermia. Particular attention was directed to possible relationships between these impedance changes and systemic blood pressure.

A65-80861

BINOCULAR BRIGHTNESS AVERAGING AND CONTOUR INFORMATION.

W. J. M. Levelt (Inst. for Perception RVO-TNO, Soesterberg, The Netherlands).

British Journal of Psychology, vol. 56, Feb. 1965, p. 1-13. 16 refs.

Binocular brightness averaging has been investigated under two conditions; with identical contour information in both eyes and with different contour information. Equibrightness curves are presented for the simple case in which right and left test fields are identical in pattern but different in luminance. These curves are for the most part linear, i.e., if the weighted sum of left and right luminance is constant, the same binocular brightness impression is produced. The sum of the weighting coefficients is unity (law of complementary shares). In the absence of eye dominance, the weights are equal, otherwise a correction for eye dominance must be made. If monocular contour information is present in one test field, brightness averaging remains linear, but the weight for that eye increases at the cost of the weight for the other eye. In a region close to a monocular contour (within 1° of visual angle), the weight approaches unity, so that binocular brightness in this region is dependent upon the luminance in one eye only. A suggested explanation of Fechner's paradox is given, and the implications of the approach for the mechanism of binocular rivalry are considered.

A65-80862**PATTERNS OF REACTION TIME RESPONSES.**

Myfanwy Kerr, Rosemary Mingay, and Alick Elithorn (Inst. of Neurol.; and Royal Free Hosp., London, Great Britain).

British Journal of Psychology, vol. 56, Feb. 1965, p. 53-59. 11 refs.

The reaction time responses of 44 subjects to paired stimuli separated by an interval of 100 msec were analyzed to test whether there was evidence for several distinct types of response patterns, and, if so, whether these patterns were associated with individual performances. The analysis confirmed both these hypotheses, six main types of response being distinguishable and the response patterns being markedly different for different individuals.

A65-80863**ON THE INTERACTION OF S-R COMPATIBILITY WITH OTHER VARIABLES AFFECTING REACTION TIME.**

D. E. Broadbent and Margaret Gregory (Med. Res. Council, Appl. Psychol. Res. Unit, Cambridge, Great Britain).

British Journal of Psychology, vol. 56, Feb. 1965, p. 61-67. 18 refs.

Choice reactions to tactual stimulation were studied, using compatible instructions (react with the finger that is stimulated) and incompatible ones (react with the corresponding finger on the other hand). It was found that decrease in compatibility increased the effect of number of alternative reactions, of uncertainty about the time of arrival of a stimulus, of a simultaneous distracting task, and of an unequal frequency of arrival of different signals. It was also noted that no significant interaction was found between time uncertainty and number of alternative signals; and that stimuli with a fixed probability of occurrence gave slower reactions when several different stimuli were presented in intervening trials, than when there was only one. The results are interpreted as according to a theoretical mechanism resembling a statistical decision.

A65-80864**CHANGES IN IMMEDIATE MEMORY WITH AGE.**

Andrew McGhie, James Chapman, and J. S. Lawson.

British Journal of Psychology, vol. 56, Feb. 1965, p. 69-75. 21 refs. Med. Res. Council supported research.

A test allowing assessment of the differential changes in auditory and visual short-term retention was given to groups of young, middle-aged, and elderly adults. The results indicated that all subjects found it more difficult to handle visually, as opposed to aurally, presented information. The decline in visual retention was found to increase with age, this being most noticeable after 60. The theoretical and practical consequences of these findings are briefly discussed.

A65-80865**SOME CONFIRMATORY RESULTS ON AGE DIFFERENCES IN MEMORY FOR SIMULTANEOUS STIMULATION.**

D. E. Broadbent and Margaret Gregory (Med. Res. Council, Appl. Psychol. Res. Unit, Cambridge, Great Britain).

British Journal of Psychology, vol. 56, Feb. 1965, p. 77-80. 5 refs.

Two experiments were carried out to investigate further the relationship between age and immediate memory for two streams of material applied simultaneously to two sensory channels. The material was presented over ordinary television transmitters during programs, viewers being requested to send their responses. In both experiments the viewers saw three items and heard another three. In Expt. I all items were digits; in Expt. II both the visual and the spoken items consisted of letters and digits, the viewers being requested to order their responses either channel by channel or class by class. Both experiments showed a deterioration in performance with age, which started earlier when the task required rapid alternation between the senses. Expt. II also allowed comparison between the two modes of recall: the eye-ear mode resulted in much superior performance.

A65-80866**VISUAL IMAGERY PRODUCED BY RHYTHMIC PHOTIC STIMULATION: PERSONALITY CORRELATES AND PHENOMENOLOGY.**

Sanford J. Freedman (Tufts U., Medford, Mass.) and Patricia A. Marks (Radcliffe Coll., Cambridge, Mass.)

British Journal of Psychology, vol. 56, Feb. 1965, p. 95-112. 32 refs. Grant AF-AFOSR-62-11.

This study is concerned with relationships between descriptions of visual imagery produced by rhythmic photic stimulation and a number of personality tests. Individuals who manifested the ability to suspend their generalized reality-orientation described more imagery; imagination and suggestibility also seemed to be important. Subjects' expectations about what they would see influenced their reports, although comprehension of the experimental design, fatigue, and motivation were not relevant. The correlated personality variables indicate a close relationship with other types of visual imagery; the phenomenology fits a synthesized description of sensory deprivation, mescaline, and hypnagogic imagery.

A65-80867**MISUSE OF RED LIGHT ON AUTOMOBILES.**

Merrill J. Allen (Ind. U., Div. of Optometry, Bloomington).

American Journal of Optometry and Archives of American Academy of Optometry, vol. 41, Dec. 1964, p. 695-699. 6 refs.

Because about 90% of the population is adversely affected by hypermetropia, color vision anomalies, and/or adverse chromatic stereopsis when viewing red lights, the continued use of red taillights (not brake lights) by the automobile industry is illogical and dangerous. Chromatic stereopsis or lateral chromatic aberration causes red light to be seen farther away than it really is, and two out of three people see this way. The loss in perceived brightness of protanopic drivers will also cause interpretation of increased distance. Focusing on red light is most difficult for hypermetropes, while green would be much better. It is thought that green lights would have none of these defects, and the author proposes that green lights be used for taillights while red is retained as a stop light.

A65-80868**THE ATMOSPHERE OF VENUS.**

Carl Sagan (Harvard U., Cambridge, Mass.)

IN: THE ORIGIN AND EVOLUTION OF ATMOSPHERES AND OCEANS. (Conference at Goddard Institute for Space Studies, National Aeronautics and Space Administration, New York, April 8-9, 1963, Proceedings).

Edited by Peter J. Brancaccio and A. G. W. Cameron.

New York, John Wiley and Sons, Inc., 1964, p. 279-288. 11 refs.

Data attempting to explain the composition of the atmosphere of Venus are reviewed. Problems with respect to water vapor, CO₂, organic molecules, temperature, and pressure are included. An explanation of how the surface stays as hot as it does is one of the key problems in understanding the Venus environment. There is as yet no view which integrates all of the observational material.

A65-80869**THE ATMOSPHERE OF MARS.**

Richard M. Goody (Harvard U., Cambridge, Mass.)

IN: THE ORIGIN AND EVOLUTION OF ATMOSPHERES AND OCEANS. (Conference at Goddard Institute for Space Studies, National Aeronautics and Space Administration, New York, April 8-9, 1963, Proceedings).

Edited by Peter J. Brancaccio and A. G. W. Cameron.

New York, John Wiley and Sons, Inc., 1964, p. 289-298. 6 refs.

Some difficulties in determining the composition, ground pressure, and structure of the atmosphere of Mars are presented. Included are both solid and inferential data. Among the former are polarimetric measurements of the total mass of the Martian atmosphere and spectrographic measurements for oxygen and water vapor. The latter covers Martian polar caps, atmospheric oxygen content, and atmospheric nitrogen content. Surface features of Mars that could have some relevance to atmospheric processes, insofar as there is some kind of interchange between the surface and atmosphere, are also included.

A65-80870**SELECTIVE ATTENTIVENESS AND CORTICAL EVOKED RESPONSES TO VISUAL AND AUDITORY STIMULI.**

Paul Spong, Manfred Haider, and Donald B. Lindsley (Calif. U., Depts. of Psychol. and Physiol., Los Angeles).

Science, vol. 148, Apr. 16, 1965, p. 395-397. 9 refs.

Grants NSG-623 and NSF GB-1844; Contract Nonr 233(32).

Cortical evoked responses to flashes and clicks were recorded from human subjects performing visual or auditory tasks under three conditions of selective attentiveness. The subjects were required to attend to the flashes and to ignore alternating clicks, or vice versa. Responses to flashes recorded from the occipital area were larger when attention was directed toward visual stimuli, and responses to click stimuli recorded from the temporal area were larger when attention was directed toward auditory stimuli.

A65-80871**IMPAIRED RECOVERY FROM HYPOTHERMIA AFTER ANTERIOR HYPOTHALAMIC LESIONS IN HIBERNATORS.**

Evelyn Satinoff (Pa. U., Dept. of Psychol., Philadelphia).

Science, vol. 148, Apr. 16, 1965, p. 399-400. 5 refs. Grant PHS NB-05394-01A1.

Hypothermia was induced by hypercapnic hypoxia in 13-lined ground squirrels, *Citellus tridecemlineatus*. When the squirrels were allowed to recover normal body temperatures at a 10°C ambient temperature, those with anterior hypothalamic preoptic lesions took 3 to 4 times longer than normal controls to reach a body temperature of 35°C.

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